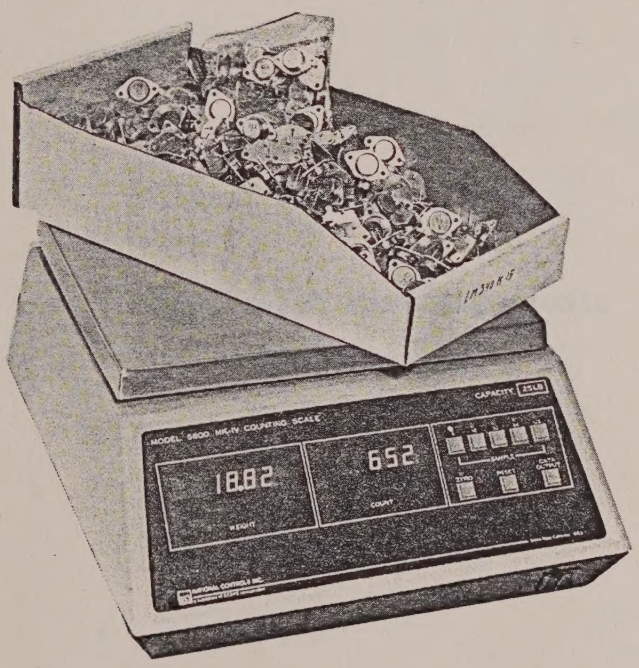
National Controls, Inc.
A subsidiary of
SCOPE Incorporated

Digital Electronic Scales

REFERENCE

MODEL 5800 MK IV ELECTRONIC COUNTING SCALE SERVICE MANUAL



National Controls, Inc.
A subsidiary of SCOPE Incorporated

1160 Hopper Avenue
P.O. Box 1501
Santa Rosa, Calif. 95402
Tel. 707/527-5555

© NCI 1977

MODEL 5800 MKIV ELECTRONIC
COUNTING SCALE

SERVICE MANUAL

8424-00026

TABLE OF CONTENTS

SECTION I	INTRODUCTION
SECTION II	SPECIFICATIONS
SECTION III	INSTALLATION
SECTION IV	OPERATION OF COUNTING SCALE
SECTION V	PERFORMANCE CHECKS AND ADJUSTMENTS
SECTION VI	PRINCIPLES OF OPERATION
SECTION VII	ASSEMBLY AND DISASSEMBLY
SECTION VIII	INITIAL SETUP
SECTION IX	TROUBLESHOOTING
SECTION X	PARTS LISTS
SECTION XI	SCHEMATICS

Digitized by the Internet Archive
in 2026

https://archive.org/details/manualsplus_12253

SECTION I

INTRODUCTION

SECTION I

INTRODUCTION

1. Introduction

1.1 The Model 5800 Counting Scale is an electronic weighing and counting instrument with digital weight and count display readouts. It can be used to determine the weight and quantity of an unknown number of identical items, or to count out a particular quantity of identical items. It counts by comparing the weight of the unknown number of items with the weight of a known sample of the same items.

1.2 The load weight is sensed by a strain gauge load cell, converted to a digital signal, processed by a microcumputer and displayed on a brilliant digital readout. A small sample weight based on 8, 16, 32, 64, or 128 pieces is used in the computation of a piece count for a large number of parts. When the sample weight is insufficient, the display reads: ADD. When the scale is overloaded, the display reads: EEEEE.

1.3 This instruction manual contains installation and operating instructions, as well as maintenance information for the Model 5800 Counting Scale. Procedures are also included for adjust-

ing the equipment to proper calibration.

Schematic diagrams, the Theory of Operation, and Troubleshooting information are provided for use in maintaining the instrument.

SECTION II

SPECIFICATIONS

SECTION II

SPECIFICATIONS

2.1 Dimensions: 15½" wide; 5 5/8" sloped front; 7½" overall height; 17 3/4" deep. (39.4 cm x 14.3 cm x 19 cm x 45.1 cm).

2.2 Self-Contained Packaging: "Sample" and "Bulk" scale functions are accomplished by just one weighing platform. Entire counting system housed in a single unit. All electronics contained on three (3) printed circuit boards. All interconnections quick disconnect type.

2.3 Shipping Weight: Approximately 45 pounds (20.4 kg)

2.4 Count Capability: Up to 99,999 pieces.

$$\text{Count Capacity} = \frac{\text{Scale Capacity}}{\text{Piece Weight}}$$

2.5 Count Functions: Five (5) sample size selector keys (8, 16, 32, 64, and 128). Greater accuracy can be achieved by utilizing larger sample size.

2.6 Continuous Display: Total weight and piece count are indicated dynamically up or down scale by increments of one part as items are added to or removed from weighing platform.

2.7 Power Requirements: 120 VAC ± 10%, single phase, 60 Hz, 50 watts maximum. Counting scales adapted to other power sources are available on special order.

2.8 Operating Temperature: 50° F. to 100° F. (10° C to 38° C).

2.9 Standard Capacities: 2, 10, 25, 50, or 100 pounds, or 0.8, 4, 10, 20, or 40 kg. The scale capacity is indicated in upper right-hand corner of front panel.

2.10 Counting Accuracy: All scales ± 1% count error for a sample equal to or greater than 0.2% of scale capacity assuming identical parts. Consult performance characteristics charts in appendix for additional information.

2.11 Weighing Accuracy: The following specifications, table 2.1, have been determined from National Bureau of Standards Handbook 44 requirements and the existing scale design. All tolerances are (±).

	SCALE CAPACITY				
	2 Lbs.	10 lbs.	25 lbs.	50 lbs.	100 lbs.
Resolution	0.001 lb.	0.001 lb.	0.01 lb.	0.01 lb.	0.01 lb.
Increasing Load	± 0.05% Reading + ½ Digit				
Decreasing Load (at ½ capacity)	0.003 lb.	0.009 lb.	0.01 lb.	0.02 lb.	0.05 lb.
Shift Test (at ½ capacity halfway center to edge)	0.002 lb.	0.006 lb.	0.01 lb.	0.02 lb.	0.03 lb.

TABLE 2.1

SECTION III

INSTALLATION

SECTION III

INSTALLATION

3.1 Initial Inspection

3.1.1 This instrument was carefully inspected both mechanically and electrically prior to shipment. It should be free of mars or scratches and in perfect electrical order upon receipt. To confirm this, the equipment should be inspected for physical damage incurred in transit. If the equipment was damaged in transit, file a claim with the carrier. Test the instrument according to the Performance Check outlined in Section 5.2.

3.2 Power Requirements

3.2.1 The Counting Scale is designed for operation on 120 VAC ± 10%, single phase, 60 Hz power, unless otherwise modified by the manufacturer for some other AC source.

3.2.2 Warning: The Counting Scale must be connected to an AC outlet equipped with a safety earth terminal. Connecting it to an AC outlet without a safety ground, bypassing the safety ground, or in any way disrupting the safety earth ground connection could make the Counting Scale an electrical shock hazard, as well as affect its operating performance.

3.2.3 Although the Model 5800 incorporates circuitry to reduce power line noise, a line may be encountered that is excessively noisy. In this case optional techniques are required to eliminate electrical noise interference. Avoid electrically noisy lines by placing the scale on a line separate from noise sources. If this is impossible, install an isolation transformer with an electrostatic shield and/or an additional line filter.

3.2.4 A three (3) wire power cable is supplied with the Counting Scale. It connects between the Counting Scales's power receptacle (lower left side of rear panel) and the AC outlet.

3.3 Location

3.3.1 The Model 5800 Electronic Counting Scale should be located in an area free from moisture or excessive dust.

3.3.2 The Counting Scale should rest on a hard, level, flat surface, free of vibration, that allows for free circulation of air under the Counting Scale chassis.

3.3.3 The scale should be located in an area free of wind or air currents. Wind or air currents against scale platform may affect scale performance. This is especially important with the two and ten pound (0.8, 4 kg) scales.

3.4 Shipping Ring

3.4.1 The two (2) pound (0.8 kg) scale is packed at the factory with a ring installed between the load cell guide plate and platter adapter. This shipping ring must be removed before using the scale. This ring is removed by lifting the platter straight up then lifting the shipping ring from the guide plate. Replace the platter.

3.5 Repacking for Shipment

3.5.1 If equipment is to be shipped to a National Controls Service Office for service or repair, attach a tag (RMR Form) showing owner (with address), complete instrument serial number, and a description of the service required. Do Not return any equipment without first consulting National Controls, or your National Controls Distributor.

SECTION IV

OPERATION OF COUNTING SCALE

SECTION IV

OPERATION OF COUNTING SCALE

4.1 Controls and Indicators

4.1.1 Scale platform holds the items to be weighed and counted.

4.1.2 Weight Readout indicates the total weight on scale platform, or total weight less container weight if container weight has been "zeroed out". (See 4.1.6 - Zero pushbutton for explanation).

4.1.3 Count Readout indicates quantity of identical items placed on scale platform. Count is computed by determining the weight of a single piece during the Sample mode, storing this weight in memory and then comparing this to the weight on the scale platform during the counting mode.

4.1.4 Power switch turns AC power input to the Counting Scale on or off. Turning power on puts scale in an initialization mode lasting about fourteen (14) seconds. During initialization, the count display readout counts down to zero. At the end of this mode, the count display will display ADD, the sample 8 and zero lamps will light and the scale will become active. Although the scale is now

ready, a warm-up period of fifteen (15) minutes for the system to stabilize will yield optimum performance from your Counting Scale.

4.1.5 Reset pushbutton switch erases all previously input information from the Counting Scale memory. Always begin new operations by pressing the Reset pushbutton.

4.1.6 Zero pushbutton sets the scale to zero. When the scale is at zero, the zero lamp lights. Pressing the Zero pushbutton with an empty container on the scale will rezero the scale, relight the zero lamp, and delete the container weight from subsequent operations.

4.1.7 Sample Quantity Selector Pushbutton Switches: Select the size of the sample used to determine the weight of a single piece. The Sample 8 is automatically selected on power on initialization as indicated by the lit Sample 8 lamp. You may stay with 8 as the sample quantity (unless the weight is insufficient for computing a piece weight, then you must select a larger sample size) or select any of the four

4.1.7 larger sample sizes, 16, 32, 64, or 128 by pressing the appropriate pushbutton. The sample size in use is indicated by a lighted indicator lamp. The larger the sample size, the more accurate will be the calculated average single piece weight resulting in a more accurate piece count.

4.1.8 Data Output Pushbutton Switch, when pressed causes the Counting Scale to transfer data to an optional recording device.

4.2 Counting Procedure

4.2.1 Plug into any grounded 115 VAC single phase 60 Hz outlet and turn power switch ON. The scale will become active fourteen (14) seconds after it is turned on. Allow fifteen (15) minutes for the system to stabilize and provide optimum performance.

4.2.2 Depress Reset pushbutton. Observe that both weight and count displays are at zero, and that the zero lamp is lit. If the zero lamp is not lit, depress the zero pushbutton, wait three or four seconds and continue.

4.2.3 If parts container is to be used, place empty container on scale platform and repeat step 4.2.2.

4.2.4 Select sample size, based upon desired performance. See Performance Characteristics curves in the Appendix.

4.2.5 Press the Sample pushbutton corresponding with the sample count: 8, 16, 32, 64, or 128. The word ADD should appear in the count display readout.

4.2.6 Place all the items in the sample on scale platform at one time. Don't count the sample out on the scale platform.

4.2.7 Observe that the sample quantity is displayed in the count display readout. If ADD still appears, the sample is insufficient to actuate count. Remove sample and repeat steps 4.2.4 to 4.2.6 with an increased sample size.

4.2.8 When sample quantity appears in count display readout, the weight of one piece has been calculated and stored in the Counting Scale memory and the Counting Scale has progressed from the sample mode to the counting mode. The Counting Scale will now count any additional parts placed on the platform up to the weight or count capacity of the scale.

(count capacity = scale capacity/piece weight $\leq$ 99,999 pieces) Total count, including sample will be displayed.

4.2.9 Sample single piece weight remains in memory for repeated count of the same parts, until either the Reset pushbutton is pressed or the power is removed from the system.

4.3 Helpful Hints

4.3.1 Larger samples will increase counting accuracy. This is because more of the minor weight variations among the items tend to be cancelled as the number of items in the sample is increased.

4.3.2 The tare weight of the containers should be consistant, or if not, see 4.3.3 below.

4.3.3 Bulk containers may be changed in mid-operation without re-establishing the sample. Simply place the empty new container on the scale platform and press the zero pushbutton. The zero lamp will light when the new container has been "zeroed out". You may now continue counting as before using the new container.

4.3.4 When the instrument shows ADD in the count display readout, the sample should be applied at one time rather than counting the sample out on the platform.

4.3.5 Optimum performance will be achieved if the scale platform is not loaded for extended periods. Place the items to be weighed or counted on the platform, record the readings and remove the load promptly.

SECTION V

PERFORMANCE CHECKS AND ADJUSTMENTS

SECTION V

PERFORMANCE CHECKS AND ADJUSTMENTS

5.1 Calibration Procedure

5.1.1 Tools Required:

a. Two weights - each ½ of full scale capacity

b. Miniature trimpot screwdriver

c. Screwdriver set

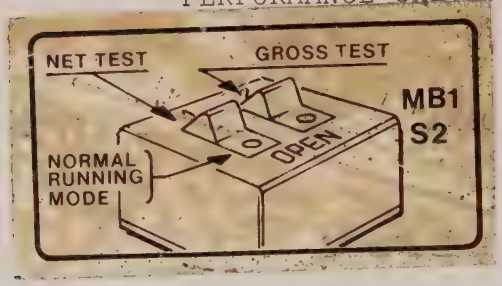
5.1.2 Turn on scale.

5.1.3 Allow 45 minutes warm-up.

5.1.4 Remove scale platform (shroud or deck) by lifting straight up. On two (2) lb (0.8 kg) be sure shipping ring has been removed. The two (2) and ten (10) lb (0.8, 4 kg) scales incorporate a self-supporting platform and do not use a spider. For these scales go to Section 5.1.6.

5.1.5 On 25, 50, and 100 pound (10, 20, and 40 kg.) scales, the platform is supported by a separate load cell spider. Note location of bubble level mount on front of spider. Carefully remove spider without torquing load cell by holding spider while turning socket head screw.

5.1.6 Turn off AC power and unplug scale. Remove scale cover by removing four (4) screws in base plate. Do steps 5.1.6 and 5.1.7 together quickly to keep power off for minimum time.



5.1.7 On two (2) and ten (10) pound (0.8, 4 kg.) scales replace platform, plug in and turn on AC power. On 25, 50, and 100 pound (10, 20, and 40 kg.) scales replace load cell spider, with bubble level mount in front. To prevent torquing load cell, carefully hold spider while turning socket head screw. Replace platform on spider. Plug in scale and turn on AC power.

5.1.8 Put scale in gross test mode by closing switch S2-2. S2 is small switch block located on digital control board. See reference label inside scale cover and figures 5.1 and 5.2. In gross test mode, the weight portion of the display reads - 50,000 with no load on platform, to 50,000 with full capacity on platform.

5.1.9 Adjust R7 on analog/load cell amplifier board, (see figures 5.1 and 5.3) until the display reads -50.000 ± .100. Observe the least significant digit of the display. This digit should vary no more than three (3) counts, in a five (5) second period. If this should occur, refer to Troubleshooting Section IX, paragraph 9.4.

5.1.10 Return the gross test switch, S2-2 to open position. Put scale in net test mode by closing S2-1. S2-1 is located in same small switch block as gross test switch. See reference label in cover and figures 5.1 and 5.2. In net test mode weight portion of display represents percent of load cell capacity.

5.1.11 With no weight on platform, depress zero switch.

5.1.12 Add weight equal to scale capacity.

5.1.13 Adjust R8 on analog/load cell amplifier board, (see figures 5.1, 5.3) one half (1/2) the amount to make the display read 99.999 (± .005) i.e., display read 99.980 - adjust R8 until display reads 99.984.

Remove weight and zero scale.

Repeat 5.1.13 until 99.999 (± .005) is obtained.

If scale indicates overcapacity by displaying EEEEE, change weight applied to 90% of scale capacity. Adjust R8 on analog/load cell amplifier board until a reading of 89.999 (+0, -.005) is obtained, i.e., display reads 90.020 - adjust R8 until display reads 90.010.

Remove weight and zero scale.

Return to 5.1.12.

5.1.14 Repeat steps 5.1.11 to 5.1.13 as needed.

5.1.15 Return scale to normal mode by opening S2-1.

5.1.16 Turn off AC power and unplug scale. Replace and secure the scale cover, spider (on 25, 50, 100 pound - 10, 20, 40 kg.) with bubble level mount in front and careful not to torque load cell, and platform. Note that cover must be snug for overload stops to work.

5.1.17 Your counting scale is calibrated. Plug in scale and turn on power.

5.2 Performance Check

5.2.1 With no weight on scale platform (shroud or deck), depress Reset, Zero, Sample 128.

5.2.2 Add 0.2% (see table 5.1) of the scale capacity to the scale deck.

5.2.3 Wait until the display shows a count of 128.

5.2.4 Remove the 0.2% weight.

5.2.5 The scale will return to zero.

5.2.6 Add 50% of the scale capacity to the scale deck.

5.2.7 The display will show a count of 32000 ± 320. Record data in table 5.2.

5.2.8 Repeat steps 5.2.1 through 5.2.7 10 to 20 times. Allow at least 10 seconds between

5.2.8 the tests.

5.2.9 Your properly calibrated scale will meet the performance specification of table 5.1 and is ready to be placed into operation. If your scale will not calibrate, refer to troubleshooting guide.

TABLE 5.1

SCALE CAPACITY	2#	10#	25#	50#	100#
Sample 128 (0.2% Capacity)	0.004#	0.02#	0.05#	0.10#	0.20#
Bulk (½ Capacity)	1#	5#	12.5#	25#	50#
Piece Count	32000	~~32000~~ ?	~~32000~~ 25600	32000	32000
Allowable Error in Piece Count	±320	±320	±320	±320	±320

TABLE 5.2

PERFORMANCE CHECK TEST DATA RECORD

Serial Number _____ Scale Capacity _____ Date _____

Test Run	Desired Reading	Actual Reading	Error
1	32000	_____	_____
2	32000	_____	_____
3	32000	_____	_____
4	32000	_____	_____
5	32000	_____	_____
6	32000	_____	_____
7	32000	_____	_____
8	32000	_____	_____
9	32000	_____	_____
10	32000	_____	_____
11	32000	_____	_____
12	32000	_____	_____
13	32000	_____	_____
14	32000	_____	_____
15	32000	_____	_____
16	32000	_____	_____
17	32000	_____	_____
18	32000	_____	_____
19	32000	_____	_____
20	32000	_____	_____

Pass: Error = (desired reading) - (actual reading) $\leq \pm$ 320

SECTION VI

PRINCIPLES OF OPERATION

SECTION VI

PRINCIPLES OF OPERATION

6.1 Introduction

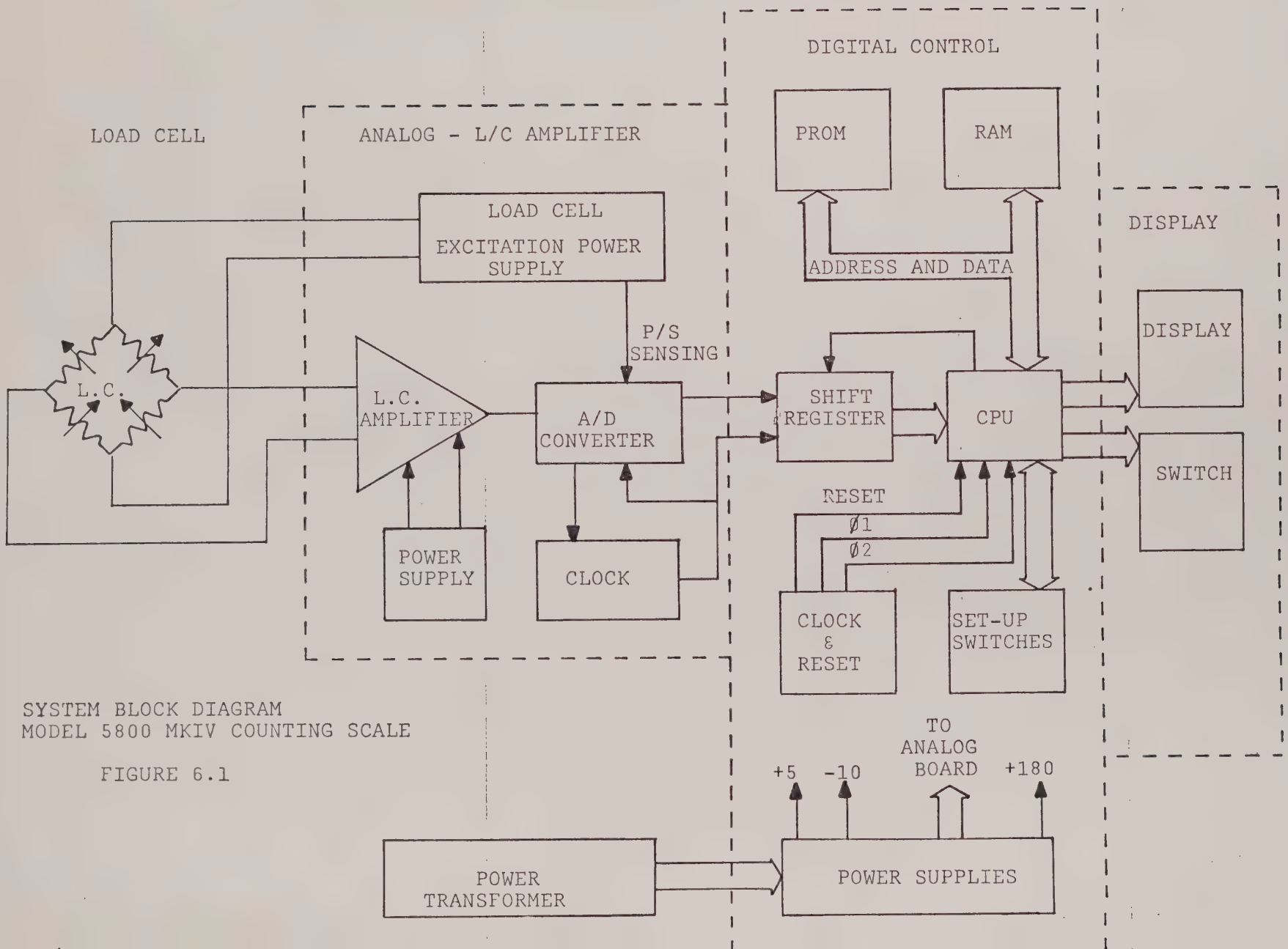
6.1.1 This section of the manual is intended to help Service Personnel understand the operating principles of the Model 5800 MKIV Counting Scale. Each major section discussed is accompanied by a simplified block diagram.

6.1.2 The NCI MKIV Counting Scale converts weight to count reading via three (3) measurement medium conversions; force to analog voltage, analog voltage to digital representation, digital re-resentation to count computation. The following descriptions describe this process in more detail.

6.2 System Block Diagram

6.2.1 Figure 6.1 is an overall block diagram of the MKIV Counting Scale, showing the system signal flow. The basic flow is sequentially through the following blocks: Load Cell, Load Cell Amplifier, A/D Converter, Shift Register, CPU, and Display.

6.2.2 A small voltage proportional to the load weight is generated at the load cell. This



SYSTEM BLOCK DIAGRAM
MODEL 5800 MKIV COUNTING SCALE

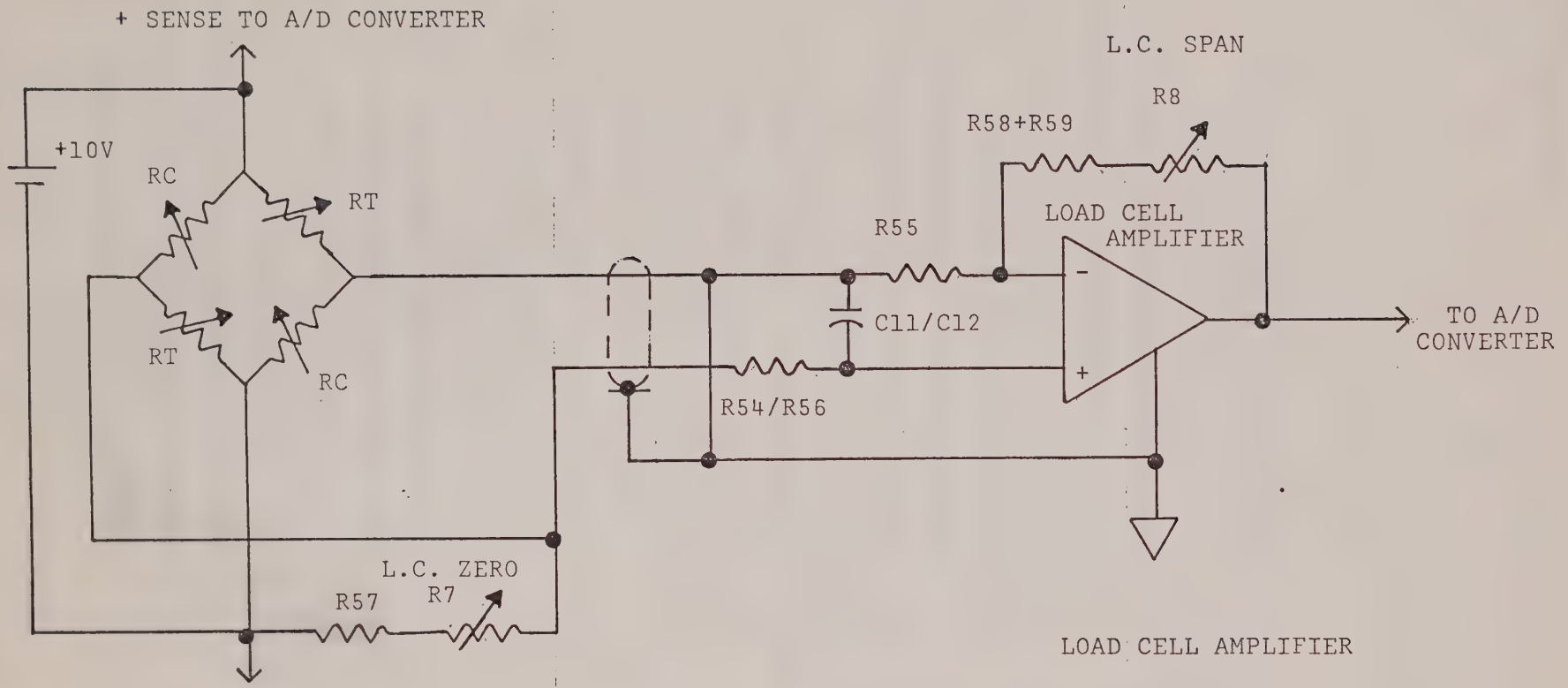
FIGURE 6.1

voltage is amplified by a high grade chopper stabilized amplifier, and is then applied to the Analog to Digital Converter input. The Analog/Load Cell Amplifier assembly contains four (4) separate power supplied, one (1) isolated supply for load cell excitation, one (1) ± 15V for the chopper stabilized amplifier, another ± 15V supply for the A/D Converter, and a 24 V supply for the A/D Converter. The chopper stabilized amplifier has its own supply to minimize noise. Any change in the load cell excitation voltage is sensed and compensated for by the ratiometric operation of the Analog to Digital Converter. The clock and binary counter are controlled by the Analog to Digital Converter state flip flops. The binary counter accumulates clock pulses proportional to the voltage at the input to the Analog to Digital Converter. One clock pulse is equivalent to 50 microvolts of input signal from the load cell amplifier.

6.2.3 The microcomputer is a 4 bit C.P.U. which operates on the data stored in Programmable Read Only Memory (PROM) and Random Access Memory (RAM). At the end of each Analog to Digital conversion, the microcomputer interrogates the shift register for the current binary counter count. Based on the inputs from the keyboard, the microcomputer provides data processing, auto-zero tracking, in-motion detecting and computes the count. When the computation is complete, the data is sent to the display.

6.3 Load Cell Amplifier

6.3.1 The circuit shown in Figure 6.2 consists of a load cell, chopper stabilized amplifier, load cell excitation voltage power supply and amplifier power supply. The load cell is a mechanical device designed with strain gauges formed to an electrical configuration of a balanced wheatstone bridge. The excitation voltage is applied to two (2) terminals of the bridge. When there is no force appl-



LOAD CELL AMPLIFIER

BLOCK DIAGRAM

Figure 6.2

ied to the load cell, the bridge is balanced with no output voltage present. When a compression force is applied to the load cell, the strain gauges change resistance, causing an unbalance of the wheatstone bridge, and an output voltage which is approximately equal to 2MV per volt of excitation times a constant K, where K equals 1 at capacity.

6.3.2 Since the input to the Analog to Digital converter has a maximum input of ±2.5 volts, the load cell has been intentionally unbalanced by resistor R7 so that the load cell output with no load applied is set close to half of its maximum negative output, which is approximately -10 millivolts. When a compression force is applied, the load cell output increases thru zero to half of its maximum positive output, which is approximately +10 millivolts. This is done to obtain more resolution from the Analog section by making full use of the Analog to Digital converters full +2.5 volt range.

The load cell amplifier is used to amplify the ±10 millivolt signal from the load cell to a ±2.5 volt signal used as an input to the Analog to Digital Converter.

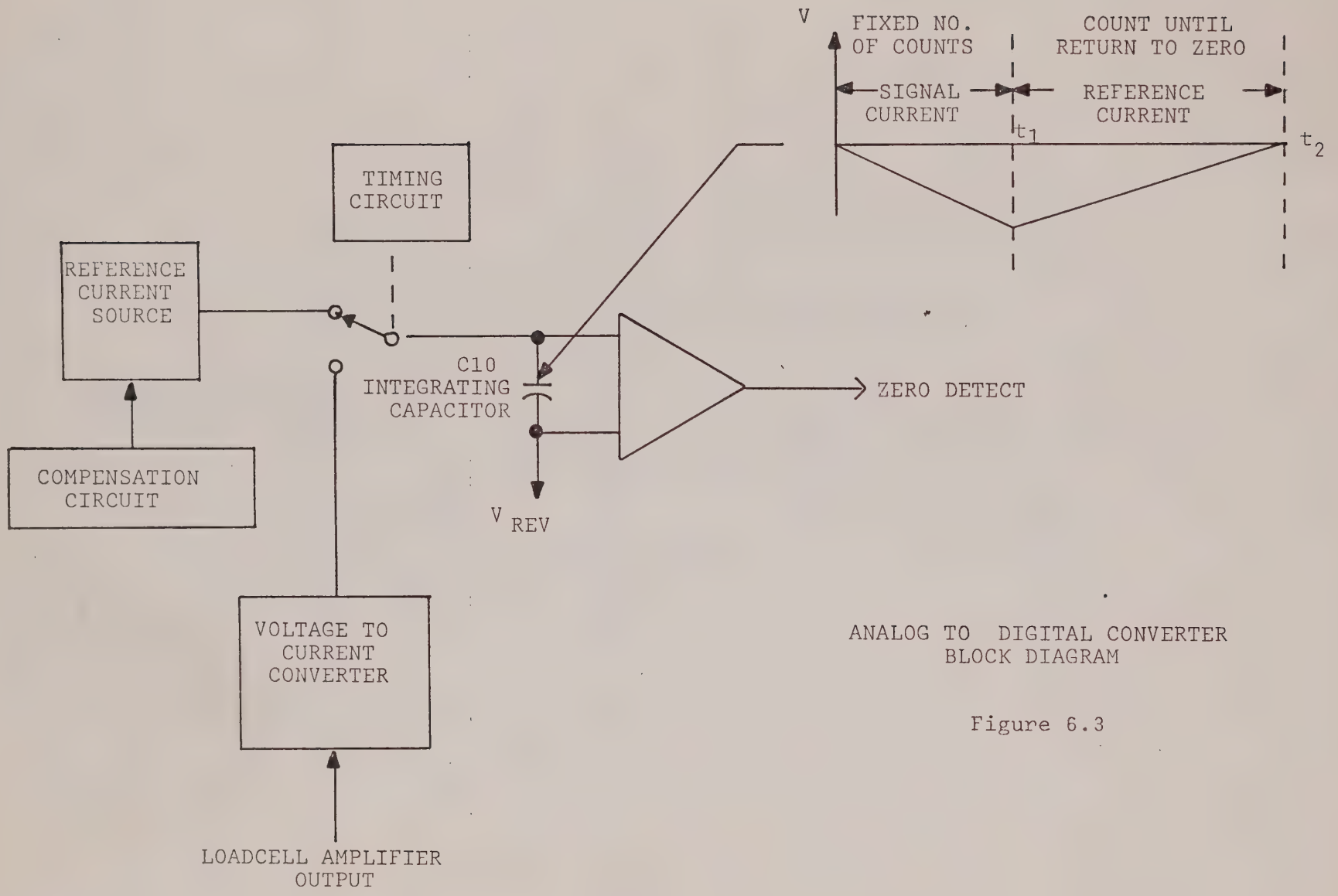
6.3.3 The load cell amplifier is a high quality low noise chopper stabilized module. The gain or span of the amplifier is determined by the ratio of feedback resistance, Rf (Rf = R8 + R58 + R59), to input resistance, Ri (Ri = R55). Increasing the feedback resistance will increase the span and decreasing the feedback resistance will decrease the span.

6.3.4 The load cell unbalance current is from the -excitation supply to the load cell positive output through the series resistance R7 + R57. Increasing the resistance will decrease the injected unbalance current resulting in less of an unbalance. The amount of unbalance is set so that with no weight on the platform the amplifier output is -2.5 volts and the span is set so that with full capacity on the platform the amplifier output is +2.5 volts.

6.4 Analog to Digital Converter

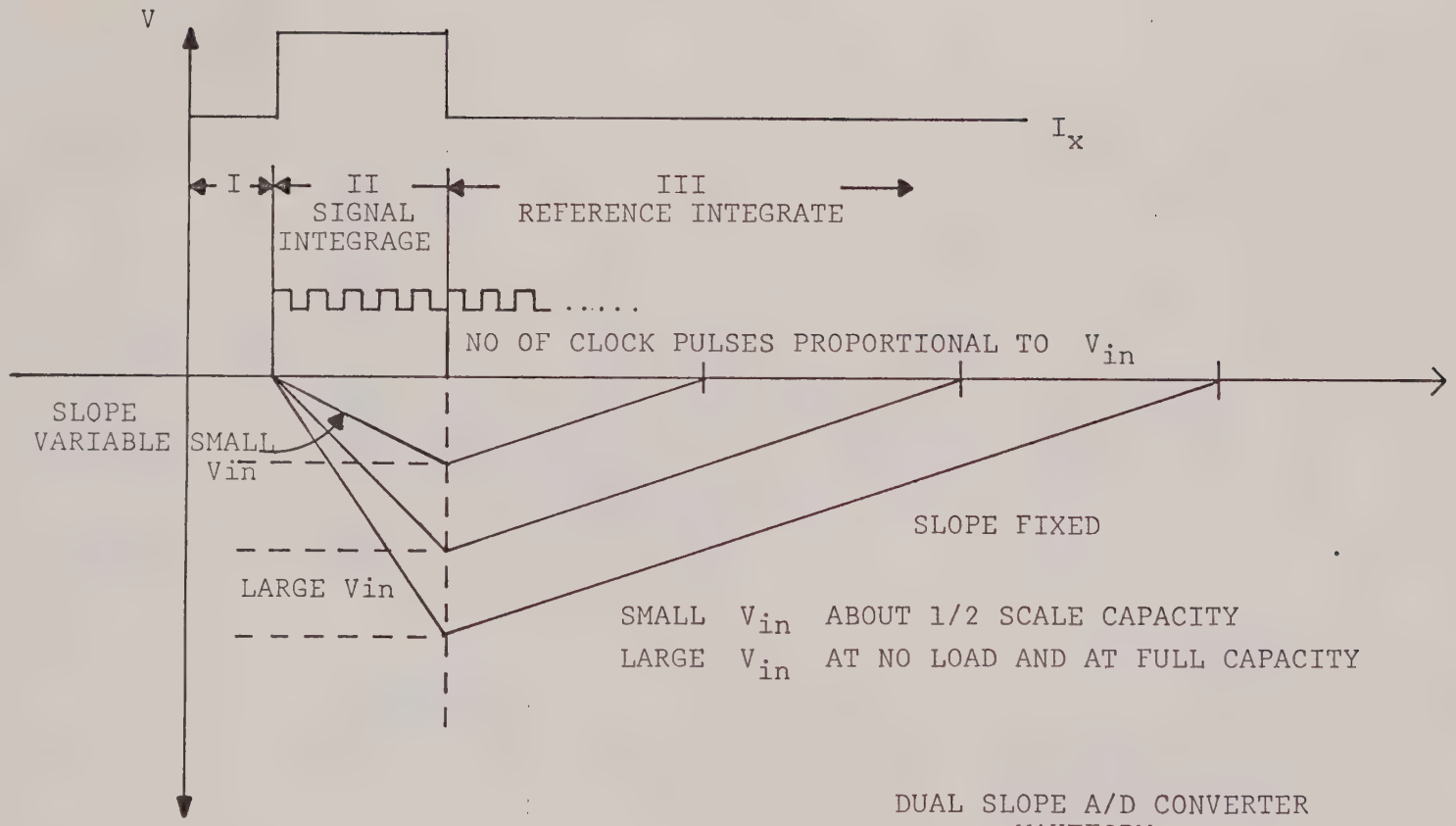
6.4.1 The Analog to Digital Converter is a dual slope type converter. The advantages of the dual slope circuit are its high accuracy, high noise immunity and requirement for only one (1) close tolerance component - the reference current. (See Figure 6.3) The dual slope process of conversion is summarized as follows in section 6.4.2, 6.4.3, & 6.4.4.

6.4.2 The analog voltage from the load cell amplifier is applied to the input of the analog to digital converter and is converted to a current. The magnitude of the current is proportional to the magnitude of the applied voltage from the load cell amplifier. The current is greatest at no load and full load when load cell amplifier output is maximum negative and positive This current, however, is unidirectional while the load cell amplifier output is bipolar. However the polarity of the applied voltage is sensed and a polarity signal is generated by IC6 and Q14 on analog/load cell amplifier board. Polarity signal is high from no load to 1/2 capacity and then low from 1/2 capacity to full load.



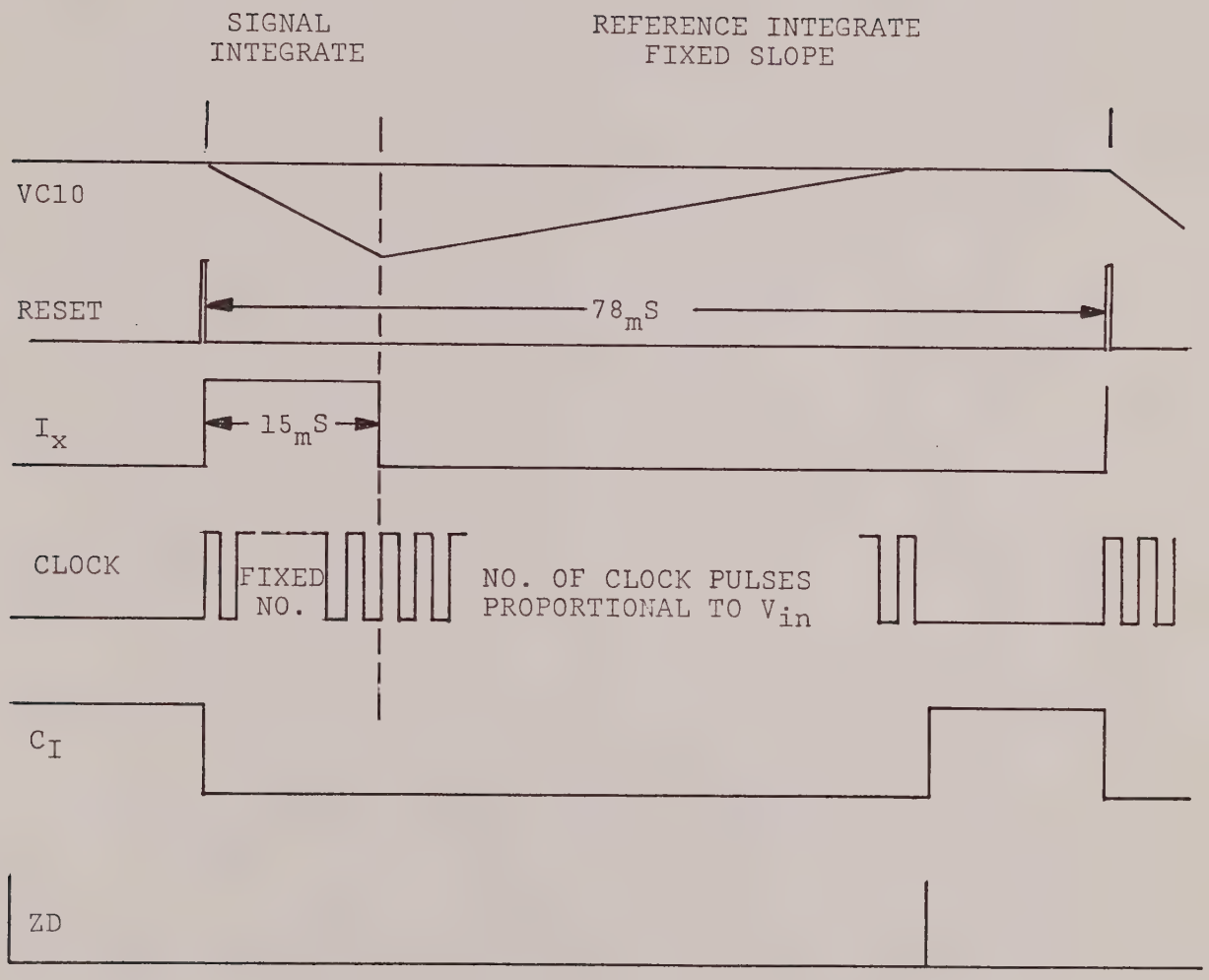
ANALOG TO DIGITAL CONVERTER
BLOCK DIAGRAM

Figure 6.3



DUAL SLOPE A/D CONVERTER
WAVEFORM

Figure 6.4



A/D TIMING DIAGRAM

Figure 6.5

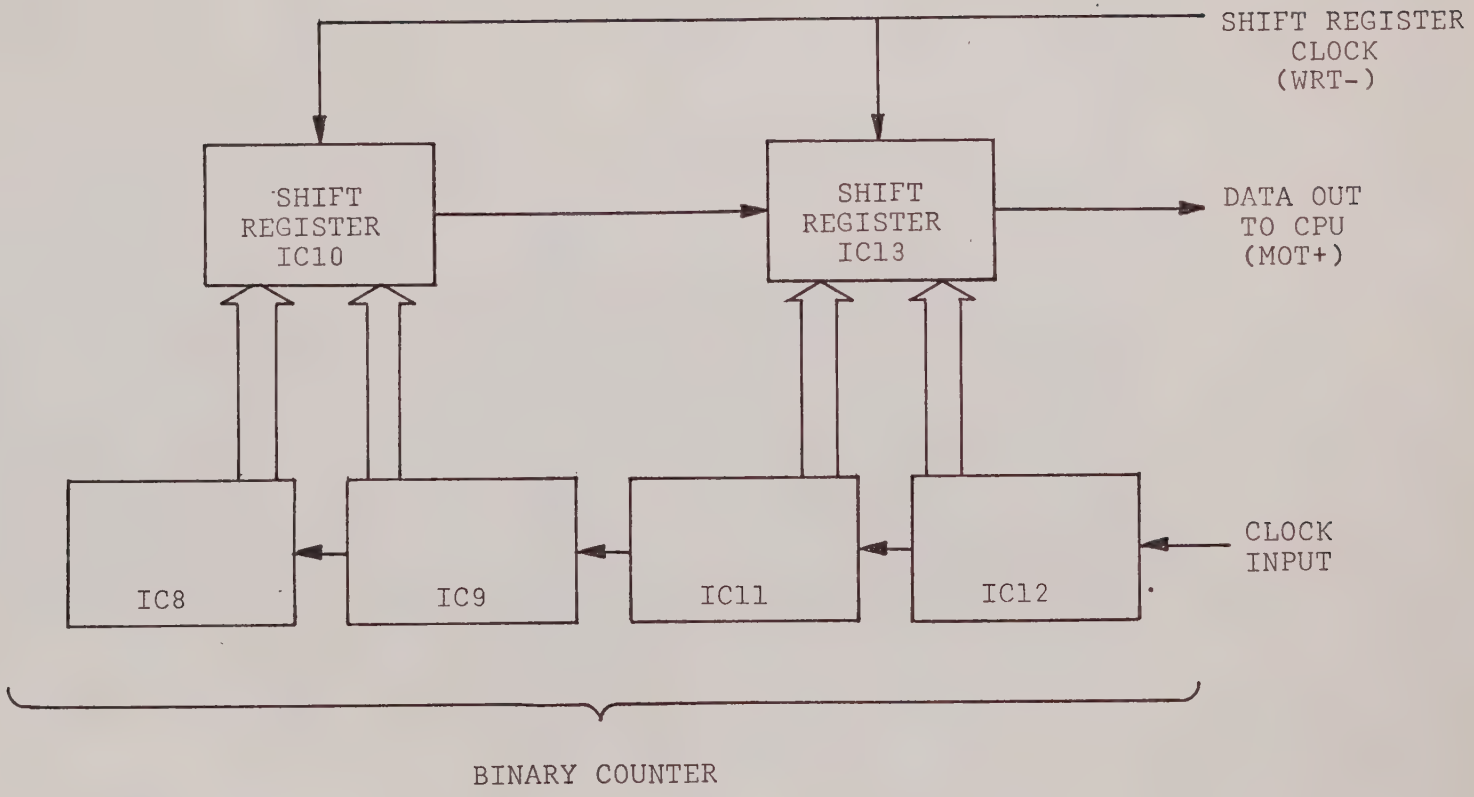
6.4.3 This current is generated proportional to the input voltage and consequently proportional to the weight on the scale platform by the bipolar voltage input, unipolar current output converter IC6, IC7 and their associated circuitry. The current developed is the result of the voltage difference across R19 and is the signal current used to charge integrating capacitor C10 for a known length of time (20,480 clock pulses, 15mS). The charge path is through Q10 or Q11 and Q16 to C10. Q16 is turned on and off by Ix. When Ix is high C10 is charging, integrating, the signal current.

6.4.4 After the fixed integrating time, the capacitor has some voltage across it dependent upon the signal current. Now Ix goes low opening the signal current charging path. There is now a path for the capacitor to discharge. This discharge is to a reference current of known value. The discharge time is variable depending on how long it takes to remove the charge accumulated during the signal integration period. While the capacitor is in the

reference discharge period a counter is accumulating clock pulses to determine the discharge time period. The discharge period continues until the zero detect circuit of Q26, Q27, Q28, Q29, Q31 detect that all of the signal current has been removed from C10 by the reference current. The reference current comes from IC4 through switch Q15. Q15 is on when both Ix and CI are low.

6.5 Binary Counter and Shift Register

6.5.1 The Binary Counter and Shift Register (See Figure 6.4) is an integral part of the Analog to Digital Converter. A predetermined number of clock pulses (20,480) counted by the Binary Counter sets the unknown voltage integration period Ix. The final integration of the capacitor back to zero by a reference current source determines the number of clock pulses accumulated by the Binary Counter. When zero is detected, the clock is turned off and the computer is signaled. The binary count (proportional to the applied weight) is now loaded into the shift register, and then shifted into the computer. The data transfer



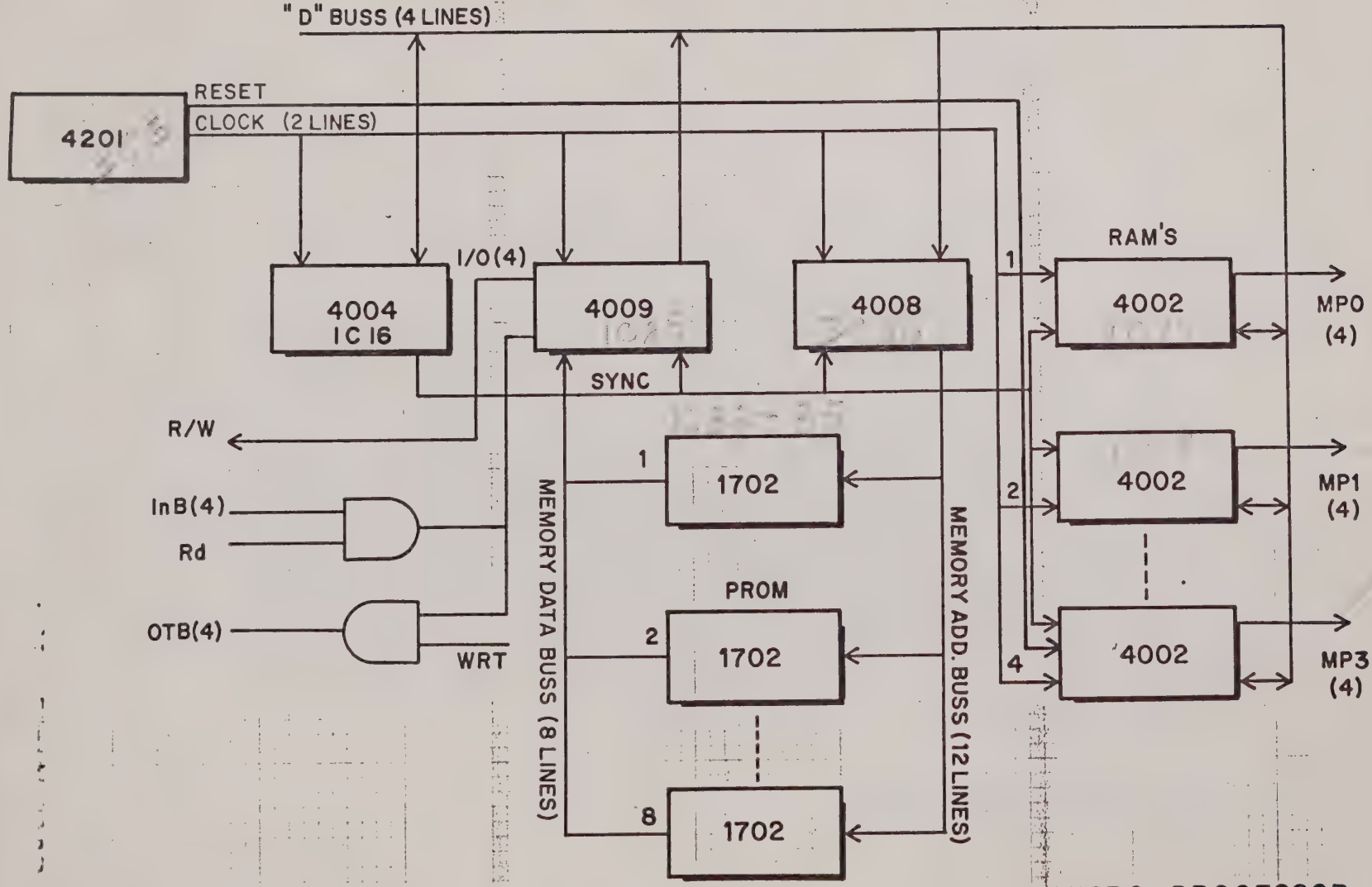
MODEL 5800 MKIV COUNTING SCALE
COUNTER AND SHIFT REGISTER

Figure 6.6

Signal is bit serial controlled by the microcomputer.

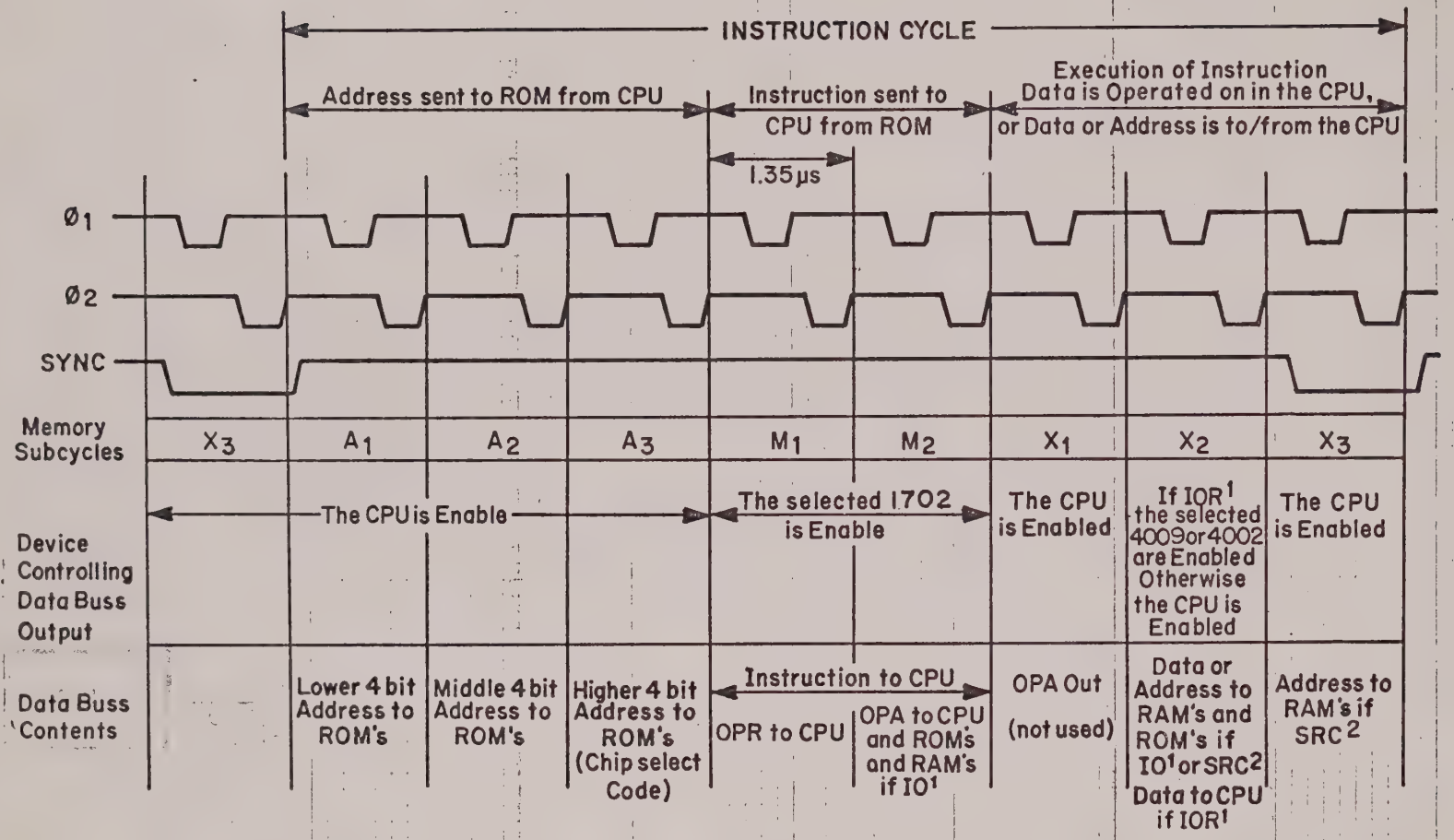
6.6 Microcomputer

6.6.1 The NCI Model 5800 MKIV Counting Scale uses a four (4) bit microprocessor (Figures 6.5 & 6.6). Data is transmitted between the system elements in groups of four (4) bits. The instruction cycle for the computer requires eight (8) memory subcycles. The eight (8) time intervals accomplish program memory addressing, instruction retrievaland instruction execution. The twelve (12) bit word required to address up to 4096 words of program memory is sent from the C.P.U. (4004) to the program memory (4702) via the interface device (4008) in three (3) time intervals defined as A1, A2, and A3. The eight (8) bits of instruction for each word are sent from the addressed program memory (4702) via the interface device (4009) to the C.P.U. (4004) in two (2) time intervals defined as M1 and M2. During the last three (3) time intervals defined as X1, X2, and X3, the C.P.U. executes the instructions.



MICRO-PROCESSOR
BLOCK DIAGRAM

Figure 6.7


INSTRUCTION CYCLE
Address sent to ROM from CPU
Instruction sent to CPU from ROM
Execution of Instruction Data is Operated on in the CPU, or Data or Address is to/from the CPU
1.35μs
Ø1
Ø2
SYNC
Memory Subcycles
X3
A1
A2
A3
M1
M2
X1
X2
X3
Device Controlling Data Buss Output
The CPU is Enable
The selected 1702 is Enable
The CPU is Enabled
If IOR[1] the selected 4009 or 4002 are Enabled Otherwise the CPU is Enabled
The CPU is Enabled
Data Buss Contents
Lower 4 bit Address to ROM's
Middle 4 bit Address to ROM's
Higher 4 bit Address to ROM's (Chip select Code)
Instruction to CPU
OPR to CPU
OPA to CPU and ROM's and RAM's if IO[1]
OPA Out
(not used)
Data or Address to RAM's and ROM's if IO[1] or SRC[2]
Data to CPU if IOR[1]
Address to RAM's if SRC[2]

(1) IO instructions control the flow of information between accumulator in CPU, I/O lines in ROM's and RAM storage. IOR stands for IO Read. In this case the CPU will receive data from RAM storage locations or I/O input lines of 4009.

(2) The SRC instruction designates the chip number and address for a following IO instruction.

6.6.2 Each time interval is generated by a crystal controlled two (2) phase clock generator (4201). The clock generator (4201) also generates the C.P.U. initialization reset function on power turn on. A sync pulse is generated by the C.P.U. (4004) to keep the RAMs (4002) and interface devices (4008, 4009) synchronized with the C.P.U. (4004).

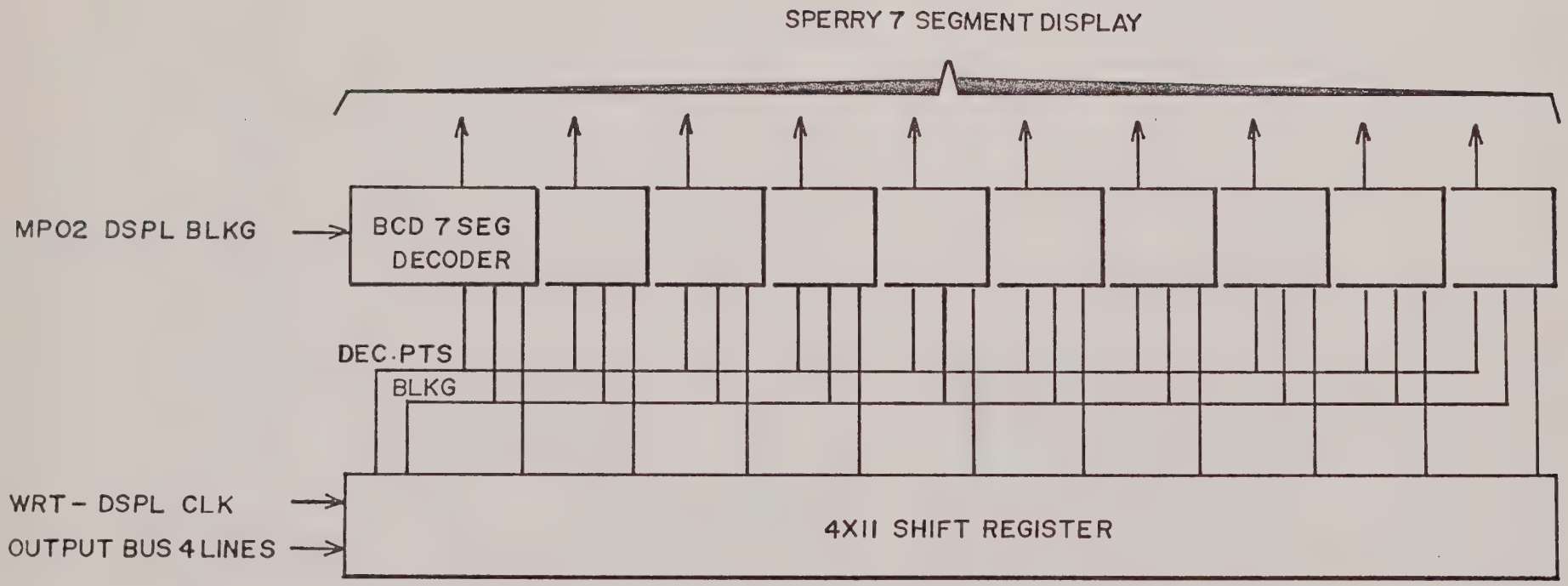
6.6.3 The microprocessor communicates with the system components via the output bus, input bus, address bus, and memory Port 0. Memory Port 0 consists of the four (4) latched outputs of of RAM 0. These four (4) lines are used to control display data and input switch information. The four (4) output bus lines go to the display board, and ROM address register. Whenever a write output bus command is executed by the computer, a hexadecimal character is presented on the output bus. During the write command, a WRT pulse is generated. This pulse generates a data clock which clocks the output bus data into the appropriate section.

6.6.4 The four (4) input bus lines are used to bring the four (4) bits of data from the system components to the computer. By changing the data on the address bus, the switch data, ROM data, or the meter data can be presented on the input bus. The computer used the read input bus command to retrieve data from the input bus.

6.7 Display

6.7.1 The digital display (Figure 6.7) receives eleven (11) four (4) bit characters from the computer. These characters are shifted into the 4 x 11 Shift Register by eleven (11) display clock pulses. The display is blanked during loading. When the display is fully loaded, the blanking is removed and the characters are decoded and displayed. BCD to seven (7) segment decoders are used to drive seven (7) segment gas discharge display modules.

6.7.2 The 180V voltage to drive the displays comes from a power supply located on the Digital Control Board.



DISPLAY
BLOCK DIAGRAM
FIGURE 6.9

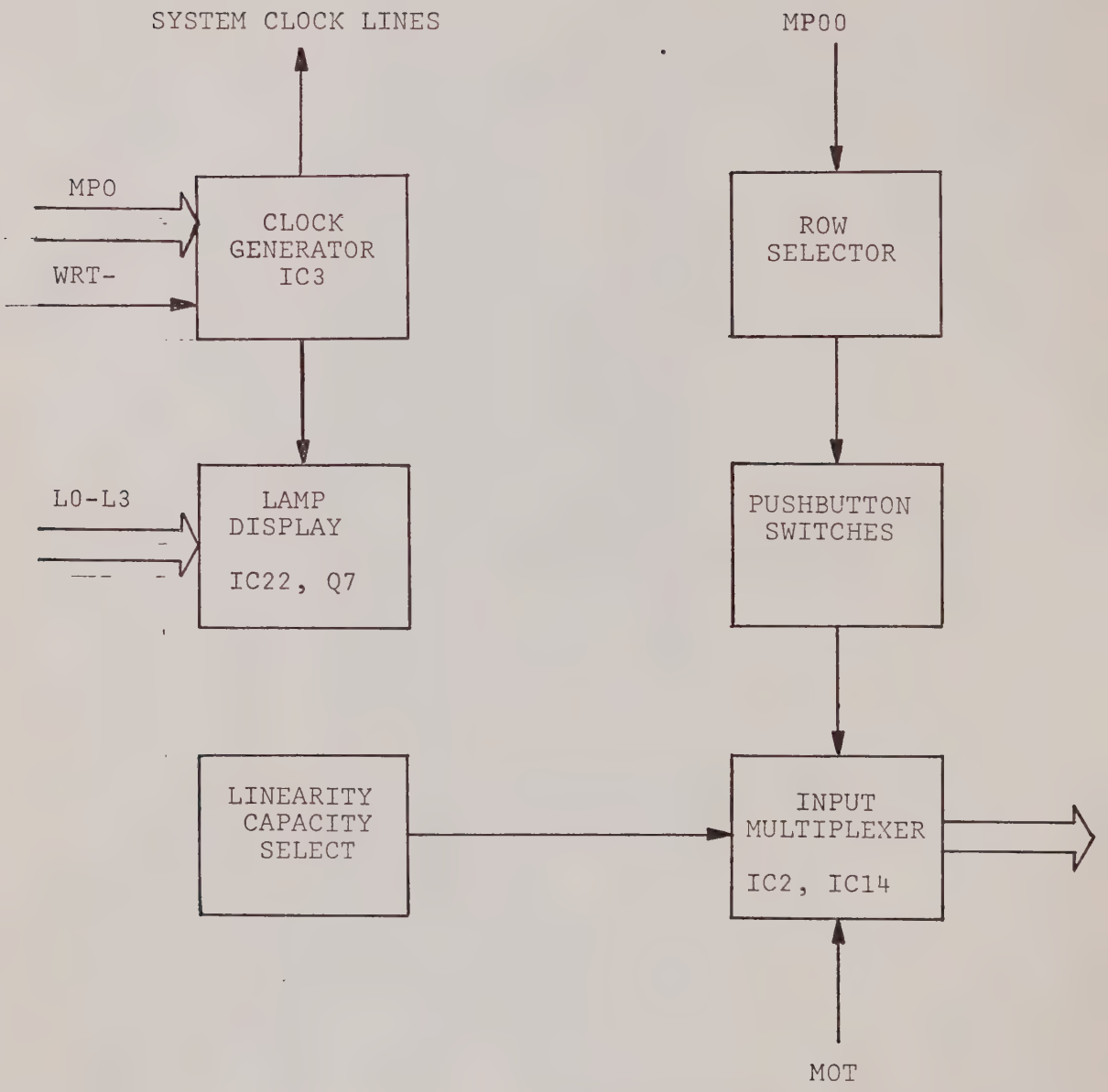
6.8 Switches and Indicators

6.8.1 The pushbutton switches are selected four (4) at a time by MP00, and are then read by the input miltiplexer (IC2). The scale capacity and the load cell linearity correction are entered on internal set-up switch S1 to correspond to each particular scale and load cell. Switch S1 is also read by the input multiplexer (IC14).

6.8.2 The LED lamp display is updated by the microcomputer to indicate scale status. The status of each light is latched and held until the next display update cycle.

6.9 Data Output Connector

6.9.1 The Model 5800 MKIV Counting Scale is supplied with general input/output interface data at socket J2. With the appropriate interface, this data will provide communication with many types of peripheial devices. Refer to "Master Schematic Model 5800 MKIV Counting Scale" (drawing 8400-00117) for signal and pin designation.



MODEL 5800 MKIV COUNTING SCALE

SWITCH MULTIPLEXER & LAMP DISPLAY

Figure 6.10

6.10 Model 5800 MKIV Mnemonics

Mnemonic	Function	Pin No.
AD0+	Address bus, one bit	12
AD1+	Address bus, two bit	11
AD2+	Address bus, four bit	10
AD3+	Address bus, eight bit	9
CLK	Display Clock	8
IN0+	Input bus, one bit	16
IN1+	Input bus, two bit	15
IN2+	Input bus, four bit	18
IN3+	Input bus, eight bit	17
MP00-	Memory Port 0, one bit	
MP01-	Memory Port 0, two bit	
MP02-	Memory Port 0, four bit	7
MP03-	Memory Port 0, eight bit	6
MP10-	Memory Port 1, one bit	19
MP11-	Memory Port 1, two bit	20
MP12-	Memory Port 1, four bit	21
MP13-	Memory Port 1, eight bit	22
OT0+	Output bus, one bit	5
OT1+	Output bus, two bit	4
OT2+	Output bus, four bit	3
OT3+	Output bus, eight bit	2
WRT	Write pulse from computer	1
GND	Ground	13, 14
V+	+5 Volts	23, 24

SECTION VII

ASSEMBLY AND DISASSEMBLY

SECTION VII

ASSEMBLY AND DISASSEMBLY

7.1 Opening Scale

7.1.1 Turn off power and unplug scale from AC source.

7.1.2 Remove scale platform (shroud or deck) by lifting straight up. The two (2) and ten (10) pound (0.8, 4 kg.) scales incorporate a self-supporting platform and do not use a spider. For these scales go to section 7.1.4.

7.1.3 On 25, 50, and 100 pound (10, 20, and 40 kg.) scales, the platform is supported by a separate load cell spider. Note location of bubble level mount on front of spider. Carefully remove spider without torquing load cell by holding spider while turning socket head screw.

7.1.4 Remove scale cover by removing four (4) screws in base plate.

7.2 Closing Scale

7.2.1 Turn off power and unplug scale from AC source.

7.2.2 Position scale cover on base plate and install four (4) screws through bottom of base plate. Note: Cover must be snug for overload stops to work.

7.2.3 On 25, 50, and 100 pound (10, 20, 40 kg.) scales, carefully replace load cell spider with bubble level mount in front by holding spider (to prevent torquing load cell) while tightening socket head screw.

7.2.4 Replace scale platform (shroud or deck).

7.2.5 Scale may now be connected to AC source and power turned on.

7.3 Removing Display Board Assembly

7.3.1 Turn off power and unplug scale from AC source.

7.3.2 Remove scale cover. See opening scale, section 7.1.

7.3.3 Remove two (2) screws from display board bracket and scale base plate.

7.3.4 Carefully unplug flex strip cable at display board connector. Remove display board.

7.4 Separating Front Panel from Display Circuit Board

7.4.1 Turn off power and unplug scale from AC source.

7.4.2 Separate front panel from circuit board. Gas discharge display modules are mounted in sockets, all other components are soldered to board.

7.5 Assembling Front Panel to Display Circuit Board

7.5.1 Position Display circuit board behind front panel.

7.5.2 Install two (2) screws in center top and bottom.

7.5.3 Position display board brackets at sides of display board with screw holes outside.

7.5.4 Install screws through brackets.

7.6 Installing Display Board Assembly

7.6.1 Turn off power and unplug scale from AC source.

7.6.2 Carefully install flex strip cable into display board connector.

7.6.3 Position assembly with bracket mounting holes aligned with tapped holes in scale base plate. Install screws.

7.6.4 Install scale cover. See closing scale, section 7.3.

7.7 Removing Analog/Load Cell Amplifier

7.7.1 Turn off power and unplug scale from AC source.

7.7.2 Remove scale cover. See opening scale, section 7.1.

7.7.3 Loosen hold down clip screw at top of analog board. Lift and rotate hold down clip to release board, and lift board from connector.

7.7.4 Loosen load cell terminal block screws and remove load cell cable.

7.8 Installing Analog/Load Cell Amplifier

7.8.1 Turn off power and unplug scale from AC source.

7.8.2 Refer to color code identifiers on load cell cable and on load cell terminal block to properly connect cable to terminal block. Tighten screws.

7.8.3 Install board into connector on digital control board.

7.8.4 Place hold down clip over circuit board and tighten hold down clip screw.

7.8.5 Check calibration. See section 5.

7.8.6 Install scale cover. See closing scale, section 7.2.

7.9 Removing Digital Control Board

7.9.1 Turn off power and unplug scale from AC source.

7.9.2 Remove scale cover. See opening scale, section 7.1.

7.9.3 Remove display board assembly. See removing display board assembly, section 7.3.

7.9.4 Remove analog/load cell amplifier. See removing analog/load cell amplifier, section 7.7.

7.9.5 Unplug transformer secondaries cable connector on right rear of digital control board.

7.9.6 Remove two (2) hex nuts from top front center and mid-right edge of digital control board.

7.9.7 Remove two (2) screws through bottom of scale base and lift out digital control board.

7.10 Installing Digital Control Board

7.10.1 Turn off power and unplug scale from AC source.

7.10.2 Position digital control board in scale base and press into insulating spacers.

7.10.3 Install two (2) screws through bottom of scale base plate into digital control board.

7.10.4 Install two (2) hex nuts on screws from component side of digital control board.

7.10.5 Plug in transformer secondaries cable connector on right rear of digital control board.

7.10.6 Install analog/load cell amplifier. See installing analog/load cell amplifier, section 7.8.

7.10.7 Install display board assembly. See installing display board assembly, section 7.6.

7.10.8 Install scale cover. See closing scale, section 7.2.

7.11 Removing Load Cell

7.11.1 Turn off power and unplug scale from AC source.

7.11.2 Remove scale cover. See opening scale, section 7.1.

7.11.3 Disconnect load cell cable from terminal block at top of analog/load cell amplifier.

7.11.4 Remove two (2) socket head cap screws from bottom of scale base plate and lift out load cell.

7.12 Installing Load Cell

7.12.1 Turn off power and unplug scale from AC source.

7.12.2 Align load cell tapped mounting holes over holes in scale base plate and install two (2) socket head cap screws.

7.12.3 Connect corresponding colors of load cell cable to terminal block at top of analog/load cell amplifier.

7.12.4 Check calibration. See section 5.

7.12.5 Install scale cover. See closing scale, section 7.2.

SECTION VIII

INITIAL SETUP

SECTION VIII

INITIAL SETUP

8.1 The adjustments in this section are performed at the factory and are not normally required again. These adjustments should only be attempted by qualified service personnel with the required equipment. Making these adjustments without prior factory authorization will void the warranty.

8.2 Equipment Required:

8.2.1 DC voltage standard Analogic Model AN 3100 or equal.

8.2.2 Load cell simulator, resistance bridge substitution box Transducers Model RBSB-1.30 or equal.

8.2.3 Digital volt meter. Data Precision 245, Fluke 8600A, or H.P. 3465A or equal.

8.2.4 Oscilloscope Tektronix Model 465 or equal.

8.3 Power Supplies

8.3.1 Remove +5V (JMP1) and -10V (JUMP2) jumpers from digital control and power supply board. Remove analog/load cell amplifier and display boards from digital control board. Plug in transformer cable to digital control board. Plug in scale and turn on AC power.

8.3.2 Test supplies to following specifications:

+Lead	-Lead	Reading
JMP1	Ground	5V±0.25V
JMP2	Ground	-10V±0.5V
XA1-12,N	XA1-11,M	20V±2.5V
XA1-13,P	Ground	23V±2.5V
XA1-14,R	Ground	-23V±2.5V
XA1-15,S	Ground	38V±3V
J1-22	Ground	185V±5V

(Points XA1 are analog/load cell amplifier connector, J1 is display board connector.)

8.3.3 With power supplies in tolerance, install jumpers +5V (JUMP1) and -10V (JUMP2).

Note: Remove AC power while installing the jumpers.

8.4 Digital Control

8.4.1 With power off, plug in display board to digital control board. Plug in 5810 test program into prom page 0 (IC 35 socket). Be sure to plug in correctly. Match pin one identification on chip with artwork on board. Turn power on.

8.4.1.1 Display test. S2-1, S2-2 - closed, S1-9 - open. Display should cycle in sequence from 00000 to 99999 with minus sign turning on during eight (8) and nine (9) display. Watch for correct display indicating good computer and display. Cycling may be halted at any number by closing S1-9. Opening S1-9 will resume cycling.

8.4.1.2 Keyboard test. S2-1 - closed, S2-2 open. Push each button on display board and note that corresponding LED lamp lights.

8.4.1.3 Linearity test. S2-1 open, S2-2 closed. Push each S1 switch from S1-1 to S1-9 from closed to open and observe display reading for each switch. Display will show hexadecimal (0-9, A-F) value of switches, 00 to FF and minus sign. An open switch is a one, or minus, a closed switch is a zero, or positive (minus sign not lit).

	S1-1	1 bit low order
	S1-2	2 bit low order
	S1-3	4 bit low order
	S1-4	8 bit low order
	S1-5	1 bit hi order
	S1-6	2 bit hi order
	S1-7	4 bit hi order
	S1-8	8 bit hi order
	S1-9	Polarity
	S1-10	Not Used

8.4.1.4 Meter display. S2-1 open, S2-2 open.

8.4.1.4.1 Turn off power and insert calibrated analog/load cell amplifier with jumper J1 removed, a 200 OHM resistor from +Excitation (TB1-Red) to ground (TB1-Green) and a 200 OHM resistor from -Excitation (TB1-Black) to ground (TB1-Green) and an Analogic voltage standard connected to analog input side of J1 (J1 terminal over TB1-Wht). Turn power on.

8.4.1.4.2 Set DC voltage standard for 0.000 volts. Adjust zero width pot R54 on digital control board and DPM zero pot R4 on analog/load cell amplifier board so that display reads zero. Set DC voltage standard to +2.000 volts. Adjust span pot R6 on analog (load cell amplifier board so display reads 9FFF or A000. Set input to -2.000 volts and display should read -9FFF or -A000.

8.4.1.4.3 Check reset pulse time of 70mS to 78mS on IC1, PIN3, on digital control board.

8.5 Analog/Load Cell Amplifier Board

8.5.1 With power off, plug in analog/load cell amplifier and display boards to digital control board. Plug in 5810 test program into PROM page 0. (IC 35 socket). Be sure analog/load cell amplifier board jumper (J1) is not

installed. Install a 200 OHM resistor from +Excitation (TB1 Red) to ground (TB1 Green) and a 200 OHM resistor from -Excitation (TB1 Black) to ground (TB1 Green). The loadcell simulator may be substituted for 200 OHM resistors. Connect Analogic DC voltage standard to analog input side of J1 (terminal over TB1-Wht) and ground. Turn power on.

8.5.2 Voltage Check

8.5.2.1 Check both ± 15 volt regulator sets IC8, IC12, and IC9, IC13 (IC8 and IC9 only on early versions) for ± 15 volts ± 0.5V.

8.5.2.2 Check excitation supply from red to black terminals with 200 OHM load cell simulator resistors in place. Adjust excitation pot R9, on analog-load cell amplifier board for 10.000 volts ± 0.002 volts.

8.5.2.3 Check 24 volt regulator IC11 on analog/load cell amplifier board for 24 volts ± 0.75 volts.

8.5.3 Bias Adjustments

CAUTION: Do not attempt these adjustments without the proper instruments.

8.5.3.1 Set bias pots R1 and R2 (on analog/load cell amplifier board) full CW.

8.5.3.2 Set input voltage to 0.0000.

8.5.3.3 Adjust meter zero pot R4 (on analog/load cell amplifier board) so display alternately reads -0 to +0.

8.5.3.4 Set input to +100uV and check that display reads +0002.

8.5.3.5 Set + bias pot R1 for +1.25 volts ± 0.05V with respect to ground at IC6 Pin6. Measure with DVM.

8.5.3.6 Set input to -100µV and check that display reads -0002.

8.5.3.7 Set - bias pot R2 for +1.25 volts ± 0.05V with respect to ground at IC 7 Pin6. Measure with DVM.

8.5.3.8 Adjust zero width pot, R54, (on digital control board so that display reads +.002, 000, and -.002 with inputs of +100µV, 0µV, and -100µV respectively. Adjust R4 on analog/load cell amplifier board so that display reads 000 with 0µV input. Repeat this step until no further adjustments are required to obtain these readings.

8.5.4 Analog Zero and Span Adjustment

CAUTION: Do not attempt these adjustments without the proper instruments.

8.5.4.1 Set input voltage to 0.0000.

8.5.4.2 Adjust meter zero pot R4, (on analog/load cell amplifier board) for display reading of 0.0000.

8.5.4.3 Set input voltage to +2.000 volts.

8.5.4.4 Adjust meter span pot R6 (on analog/load cell amplifier board) for display reading of A000.

NOTE: If span pot R6 is within 20% of end, change value of R26 on analog/load cell amplifier board. To decrease span, decrease resistance; to increase span, increase resistance.

8.5.4.5 Set input voltage to -2.000V and verify that display reads -A000 $\pm$ 2.

8.5.4.6 Set input voltage to 0.000.

8.5.4.7. Adjust meter zero pot R4, (on analog/load cell amplifier board) for display reading of 0000.

NOTE: If zero pot R4 is within 20% of end, change value of R23 on analog/load cell amplifier board. Decrease resistance to go negative, increase resistance to go positive.

Adjust overcapacity pot R5 on analog/load cell amplifier board for 2.7 volts at IC2 pin 3. Measure with DVM.

8.5.5 Linearity

8.5.5.1 Check zero and span.

8.5.5.2 Check display with the following input voltages, both positive and negative.

Analog Input	Display Reading
± .000V	± 0000 ± 2
± .500V	± 2800 ± 2
± 1.000V	± 5000 ± 2
± 1.500V	± 7800 ± 2
± 2.000V	± A000 ± 2
± 2.500V	± C800 ± 2

8.5.6 Ratio Offset

CAUTION: Do not attempt these adjustments without the proper instruments.

8.5.6.1 Turn off power.

8.5.6.2 Remove both 200 OHM load cell simulator resistors from analog/load cell amplifier board.

8.5.6.3 Remove DC voltage standard and install jumper J1 on analog/load cell amplifier board.

8.5.6.4 Connect load cell simulator to TB1 terminals on analog/load cell amplifier board.

8.5.6.5 Turn on power.

8.5.6.6 Set load cell simulator to apply full scale positive input to amplifier.

8.5.6.7 Rotate excitation supply pot R9 on analog/load cell amplifier board from maximum CCW to maximum CW. Note range of display readings.

8.5.6.8 Rotate ratio offset pot R3 on analog/load cell amplifier board slightly CW and repeat step 8.5.6.7 until display change is ± 2 digits as R9 is turned from end to end.

8.5.6.9 Reset excitation pot R9 for 10.000 volts ± 0.002V from TB1-red to TB1-black.

8.6 Memory Test

8.6.1 Turn off power and plug in 5810 memory test program into page 0 (IC35 socket). Plug in MEM A PGX program into each remaining page 1 to 4 (sockets IC34 to IC31).

8.6.2 Turn power on.

8.6.3 With S1 switches S1-1, S1-2, S1-3 select memory pages 1 to 4 and observe display. If display stops counting, there is a bad socket, and display will contain the bad memory address.

8.7 Counting Scale Set Up

8.7.1 Turn off power.

8.7.2 Install normal program set in pages 0 to 4. See Table 8.1 for proper program set. Be sure chips are properly oriented in their sockets. Match Pin 1 identification on the chip, with the circuit board artwork.

Table 8.1 Counting Scale Program Chip Sets

	IC35 Page 0	IC34 Page 1	IC33 Page 2	IC32 Page 3	IC31 Page 4
Standard lbs.	0C40	1C40	2C41	3C42	X
Standard kgs.	0C41	1C40	2C41	3C42	X
Two (2) lbs.	0C40	1C41	2C41	3C42	X
Count Only	0C40	1C50	2C51	3C43	X
Universal Scale Fact.	0C42	1C40	2C41	3C42	4C42

8.7.3 Replace load cell simulator at TB1 with load cell. Load cell cable is color coded to correspond to colors marked on TB1. Install platform on load cell.

8.7.4 Set load cell capacity into S1 switches S1-6, S1-7, and S1-8, according to table 8.2.

Table 8.2 Load Cell Selection

Load Cell	S1-8	S1-7	S1-6	Binary
2 lbs.	Closed	Open	Open	3
10 lbs.	Open	Closed	Closed	4
25 lbs.	Open	Closed	Open	5
50 lbs.	Open	Open	Closed	6
100 lbs.	Open	Open	Open	7

8.7.5 Turn on power.

8.7.6 Exercise load cell for about one minute.

8.7.7 Gross adjust (deadload)

8.7.7.1 Close S2-2. With no weight on platform adjust R7 on analog/load cell amplifier board for display reading of -50.000 ± 100 counts. Return S2-2 to open.

R1 Low end
R2 High end
R7 -250 empty
+250 loaded

8.7.8 Net Adjust (Span)

8.7.8.1 Close S2-1. With full capacity on platform, adjust R8 on analog/load cell amplifier for display reading of ~~99.999~~ 20kg 1.999. Reading should not vary more than ± 3 counts.

8.7.9 Linearity

8.7.9.1 Close S2-1, plate one half (1/2) capacity on platform. Display should read 50.000 ± 5 counts.

8.7.9.2 Set linearity correction on switches S1-1 to S1-5 according to Table 8.3

8.7.9.3 Open S2-1

Table 8.3 Linearity Correction

S1-	Closed Counts/Polarity	Open Counts/Polarity
1	0	2
2	0	4
3	0	9
4	0	18
5	0	32
9	-	+

8.7.10 Overload Adjust

8.7.10.1 Apply 50% capacity to scale platform, zero weight out by pressing zero button. Place an additional 50% on platform. Adjust overcapacity pot. R5 on analog/load cell amplifier so display does not read EEEEE. Apply an additional 5% on platform. Adjust overcapacity pot R5 so display read EEEEE at 105% capacity.

8.7.11 Overload Stops Adjust

8.7.11.1 Turn off power and unplug scale while installing scale cover. Be sure cover is snug. Install platform. Plug in scale and turn on power.

8.7.11.2 To set overload stop on two (2) and ten (10) pound (0.8, 4 Kg) Scales: Place full capacity on center of platform. Adjust stop screw located at bottom of platter stem so scale reads full capacity and there is approximately 0.010 inch (0.25 mm) clearance between platform and cover under weight.

8.7.11.3 To set overload stops on 25, 50, and 100 pound (10, 20, 40 Kg) scales:

Place 75% capacity on corner of platform. Adjust overload. Stop under corner where weight is applied so scale reads 70% capacity. Repeat for each corner.

SECTION IX

TROUBLESHOOTING

SECTION IX

TROUBLESHOOTING

9.1 Introduction

9.1.1 All of the model 5800 counting scale electronics is contained on three (3) printed circuit boards. Although the circuitry is complex, troubleshooting by board substitution can easily locate trouble to one of the circuit boards or to the load cell. The tests in this section will help you to locate the defective board and possibly the particular component. If you prefer not to fix the defective part yourself, contact your NCI distributor for return instructions. See section 3.4.1.

9.2 Equipment Required

9.2.1 For service a qualified electronics technician and the following equipment is suggested:

9.2.1.1 Spare set of circuit boards

9.2.1.2 Complete microcomputer chip set

9.2.1.3 Complete program chip set for scales you will service. See table 8.1 , program chip sets.

9.2.1.4 5810 Test program chip.

9.2.1.5 Load cell simulator (resistance bridge substitution box), Transducers inc. Model RBSB-1-30.

9.2.1.6 DC voltage standard, Analogic model AN 3100.

9.2.1.7 Digital voltmeter, Data Precision model 245, or Fluke model 6800A, or H.P. model 3465A.

9.2.1.8 Oscilloscope, Tektronix model 465, H.P. model 1740A.

9.2.1.9 Decimal weight set (0.001 to 2 lbs.) or metric equivalent for metric scales.

9.2.1.10 Weight set consisting of: Two--10 pound weights, one--5 pound weight, and two--50 pound weights or metric equivalents for metric scales.

9.3 Symptoms and Cures

9.3.1 This section will help you to locate a defective module. Unless the problem is a defective fuse, which can be easily checked and replaced from the outside of the scale, the scale cover should be removed and the platform replaced. See paragraphs 7.1, opening scale and paragraphs 7.2.3 to 7.2.4 for replacing the

platform. In this position the scale will be in an operational position and there will be ready access to the electronics for measurements, substitutions and adjustments.

9.3.2 A first step should be to visually inspect the circuit boards for an obvious problem. Check all ICs in the microprocessor section for proper orientation in their sockets. Note: Be sure power is off when removing or inserting these chips. Also these chips are MOs and subject to damage from static electricity. See precautionary note in appendix. Check for proper connections between display and digital control boards, transformer and digital control board, analog and digital control boards.

9.3.3 The second step should be to measure all power supply voltages. A faulty power supply may produce strange symptons and it is not difficult to check these now. Remember there are two (2) separate $\pm$ 15 volt supplies, a 24 volt supply and an excitation supply on the Analog/Load Cell Amplifier board, in addition to the

power supplies on the digital control board. Repair any problems before continuing. Try to determine cause of failure. The three (3) terminal regulators used in the 5800 counting scale incoporate overcurrent and overload protection and should protect themselves. A supply with no output voltage but normal input to the regulator may indicate the regulator shut itself off on overload, and will stay that way until the short is removed.

9.3.4 Next, turn off power and install the 5810 test PROM in page 0 memory, IC35 socket. Turn on power and run the following tests:

TABLE 9.1

Selecting 5810 Tests

S2-2	S2-1	5810 Test
Open	Open	Meter (A-D Output)
Open	Closed	Keyboard
Closed	Open	Linearity (S1 Switches)
Closed	Closed	Display (SW1-9 Open Cycles) Closed) Halts Count)

9.3.4.1 In meter test, the computer reads the analog to digital converter and displays the results in four (4) hexadecimal (0-9, A-F) digits and sign.

9.3.4.2 In keyboard test, the computer reads the front panel pushbutton switches and lights the corresponding indicator lamp.

9.3.4.3 In linearity test the computer reads switches S1-1 to S1-9 and displays their status in four (4) hexadecimal (0-9, A-F) with S1-9 determining the sign.

9.3.4.4 In display test, the computer fills the display with numbers from 0 to 9 in a continuous sequence, with S1-0 open. With S1-9 closed the count will halt with current count. Opening S1-9 will resume the counting.

9.3.5 If all tests fail and all power supplies good, check microprocessor section with oscilloscope.

9.3.5.1 Check Ø1 and Ø2 clocks. High

9.3.5.1 should be +5 volts for 1mS and low should be -10 volts for 0.4mS. Check at 4201 clock generator chip IC15 pins 14 (Ø1) and 3 (Ø2). If absent or distorted, turn off power and replace IC15. Be sure to insert the 4201 in correctly. Orient the pin one identification on the chip with board artwork. Turn on power. Repeat 5810 tests.

9.3.5.2 Check reset at 4201 (IC 15) pin 12 and pin 13. After power has been on for several seconds, the reset input (pin 12) will rise slowly from -10 volts to ground and remain at ground. The reset output (pin 13) will switch from -10 volts to +5 volts. If either input or output do not reach their final states within 3 seconds, turn off power and replace the 4201. Be sure to properly orient the IC in its socket. Turn on power. Repeat 5810 tests.

9.3.5.3 Turn off power. Replace entire microprocessor chip set (except 5810 test PROM). Orient each properly in socket. Note these chips are MOS and subject to damage from excessive static electricity. Turn on power and run 5810 test again.

9.3.6 If only meter test fails:

9.3.6.1 Set switches (S2) for meter test and measure amplifier output at J1 on analog/load cell amplifier board with DVM. Voltage should be between -2.5 volts with no weight on platform to +2.5 volts with full capacity on scale.

9.3.6.2 If voltages are correct, load cell and amplifier are good. Check A-D on analog board. Check waveform on integrating capacitor C10 (lead toward TB1) see figure. Check control signals IX, $\overline{IX}$, CI, $\overline{CI}$, ZD, POL.

9.3.6.3 If voltage at J1 is out of range, from no load to full load, replace load cell with load cell simulator. Set simulator to 4mV/V. Measure voltage at J1 again. If normal problem is with load cell, however to be sure vary load cell simulator and see that voltage varies between -3V and +3V with input between -10mV and +10mV.

9.3.6.4 If voltage at J1 is out of range with load cell simulator, problem is with amplifier. Replace analog/load cell amplifier board.

9.3.7 If only keyboard test fails:

9.3.7.1 Substitute display board. If this cures the problem, display board is defective. If problem remains, substitute digital control board with the original display board.

9.3.7.2 If problem is in display board, check light emitting diode (LED), switches IC24 and IC22 with oscilloscope. Check signals MP00, L0. L1, L2, and L3.

9.3.8 If linearity test fails, problem is on digital control board. Check signals MP (IN0), MP (IN1), MP (IN2), MP (IN3), and MP (AD0), at IC14 (8123) and signals MP (AD1) and MP (AD3) at IC4 and IC5. If signals are not pulsing between 0 and 5 volts or levels are intermediate check those ICs.

9.3.9 If display test fails, be sure S1-9 is open for cycling, substitute display board. If problem is on display board, check signals associated with bad digit. If entire display is blank and 180 volts at display is good, check blanking signal (MP02), at IC25 pins 9 and 8. If a digit is bad, the gas discharge display is mounted in sockets and digits may be substituted to locate fault.

9.4 Noise (Display Flicker)

9.4.1 With 5810 test program installed in memory page 0 (IC35 socket) isolate noise to load cell, amplifier, or analog to digital converter.

9.4.1.1 Short input to amplifier by shorting terminals TB1-white to TB1-green. If display reads zero with less than three (3) counts of flicker in a five (5) second period, amplifier is good and noise due to load cell, analog section or excitation supply. Verify by substituting load cell simulator for load cell. If display is quiet with simulator at zero and span, load cell is noisy. Replace load cell and set up scale with new load cell.

9.4.1.2 If noisy with amplifier input shorted, noise may be due either to amplifier or analog to digital converter.

9.4.1.2.1 Short amplifier output to ground. If still noisy analog to digital converter noisy. It is suggested that a noisy analog to digital converter be returned to an NCI distributor for repair and recalibration.

If quiet with amplifier output grounded, remove Jumper J1 and connect Analogic to digital converter input. Set Analogic to -2.5 volts and +2.5 volts. If display is quiet at span, amplifier is noisy. If display is noisy at span, analog to digital converter is noisy.

SECTION X

PARTS LISTS

PART	ASSY	DESC	U/M	MS	QTY			
7405-00146		DISPLAY 5800	1000842		7405			
1103-00212		33 MF 10 10 SPR 150D			1.0000	C2		
1104-00205		0.01 MF 100 20 SPR-TG			15.0000	C1	C3-16	
1111-00142		150 OHM 5% 1/4W			6.0000	R47-52		
1111-00162		1.0 K 5% 1/4W			5.0000	R40-43	R46	
1111-00170		2.2 K 5% 1/4W			11.0000	R12-22		
1111-00178		4.7 K 5% 1/4W			6.0000	R34	R44	R53-56
1111-00186		10 K 5% 1/4W			11.0000	R1-11		
1111-00213		130 K 5% 1/4W			1.0000	R35		
1111-00225		430 K 5% 1/4W			4.0000	R36-39		
1111-00234		1.0 M 5% 1/4W			11.0000	R23-33		
1115-00142		PIV 75V IN4148			11.0000	CR1-11		
1117-00100		NPN HIGH VOLTAGE MPS-A43			5.0000	Q1-5		
1117-00226		NPN SATURATED SW 2N 5134			1.0000	Q7		
1122-00226		DM 7442N DECODER			1.0000	IC22		
1122-00380		SN 74LS00N QUAD 2IN NAND GATE			1.0000	IC25		
1122-00387		SN 74LS04N HEX INVERTER			2.0000	IC24	IC26	
1122-00408		SN 74LS42N 1 OF 10 DECODER			1.0000	IC23		
1122-00450		SN 74LS95N 4 BIT SHIFT REG			11.0000	IC11-21		
1122-00723		DM 8880 7 SEG DECODER/DRIVR			10.0000	IC1-10		
1131-00114		KEYBUTTON SPST 1BUTTON MODULE			8.0000	S1-8		
1139-00114		24 RED A-3504-03			AS REQUIRED			
1142-00352		AMP PIN AMP PIN CONTACT 60618-			1.0000	P2		
1145-00114		5.0 105MW ORAN MV5153			5.0000	DS5-9		
1145-00128		5.0 105MW YEL MV5353			1.0000	DS10		
1145-00163		SP-352 DISPLAY			1.0000	DS3		
1145-00170		SP-353 DISPLAY			3.0000	DS1,2,4		
1145-00198		CS-352 NUM DISPLAY SOCKET			1.0000	XDS3		
1145-00205		CS-353 NUM DISPLAY SOCKET			3.0000	XDS1,2,4		
1160-00100		1 F ANSLEY SOCKET STRIP 741			20.0000	XU1		
1161-00098		1 CKT AMP PIN HOUSING 480350-0			1.0000	P2		
1403-00146		DISPLAY 5800 1000841			1.0000	PWP		

PART	ASSY DESC	U/M	NS	QTY		
7405-00147	DIG CONTROL 5800	1000842		7405		
1001-00215	MCH SLT BND 6-32 .38 STLCAD			AS REQUIRED 5	REQ	
1006-02549	SEM PHL PAN 4-40 .38 STLCAD			AS REQUIRED 3	REQ	
1025-00114	NUT KEP 6-32 CADPLT			AS REQUIRED 5	REQ	
1031-00121	WASHER FIBER FLT 6			AS REQUIRED 6	REQ	
1043-00149	SPACER AMATON 95333-A-440-0			AS REQUIRED 5	REQ	
1068-00171	CLIP,PANEL SUPPORT 5800			1.0000		
1074-00191	CBL TY PNDT SST-25-MP			AS REQUIRED 11	REQUIRED	
1102-00100	390 PF 100 10 EPOXY MYLAR			1.0000 C7		
1103-00100	0.82 MF 35 10 SPR 196D			1.0000 C25		
1103-00107	1 MF 35 20 SPR 196D			2.0000 C2	C36	
1103-00142	3.3 MF 35 209 SPR 196D			1.0000 C5		
1103-00156	7 MF 250 SPR 39D			1.0000 C1		
1103-00296	800 MF 50 SPR 39D			3.0000 C10	C12	C13
1103-00310	2300 MF 50 SPR 39D			1.0000 C8		
1103-00317	2500 MF 25 SPR 39D			1.0000 C11		
1103-00338	8000 MF 15 SPR 39D			1.0000 C9		
1104-00106	18 PF 1000 20 SPR-5GA			2.0000 C21,22		
1104-00177	0.001 MF 1000 20 SPR-5GA			1.0000 C15		
1104-00184	0.002 MF 1000 20 SPR-5GA			1.0000 C17		
1104-00205	0.01 MF 100 20 SPR-TG			16.0000 SEE	ASSY	
1104-00282	0.22 MF 50 20 EPOXY DIP			2.0000 C16	C18	
1108-00246	1.00 K RN60C 1%			1.0000 R7		
1111-00135	75 OHM 5% 1/4W			1.0000 R1		
1111-00138	100 OHM 5% 1/4W			6.0000 SEE	ASSY	
1111-00154	470 OHM 5% 1/4W			10.0000 SEE	ASSY	
1111-00162	1.0 K 5% 1/4W			7.0000 SEE	ASSY	
1111-00166	1.5 K 5% 1/4W			1.0000 R8		
1111-00170	2.2 K 5% 1/4W			2.0000 R21,22		
1111-00172	2.7 K 5% 1/4W			3.0000 R4,5,6		
1111-00176	3.9 K 5% 1/4W			1.0000 R34		
1111-00178	4.7 K 5% 1/4W			13.0000 R11-20	R29-31	
1111-00182	6.8 K 5% 1/4W			4.0000 R45-48		
1111-00184	8.2 K 5% 1/4W			2.0000 R24,25		
1111-00210	100 K 5% 1/4W			1.0000 R9		
1111-00218	220 K 5% 1/4W			1.0000 R55		
1111-00234	1.0 M 5% 1/4W			1.0000 R37		
1112-00107	4.7 K 2% 1.1W 7			3.0000 RP1	RP4,5	
1112-00121	15.0 K 2% 0.4W 5			2.0000 RP2,3		
1113-00268	2 K TOP PC	1	CER	1.0000 R54		

1115-00114	50 PRV- 1AMP IN4001	1.0000	CR14
1115-00135	600 PRV- 1AMP IN4005	8.0000	SEE ASSY
1115-00149	PIV 200V IN5624	2.0000	CR5,6
1116-00156	17 0.5 20 IN5247	1.0000	CR1
1117-00177	PNP G.P. AMP + SW 2N 3906	1.0000	Q7
1117-00226	NPN SATURATED SW 2N 5134	2.0000	Q3 Q6
1117-00240	PNP G.P. AMP + SW 2N 5139	2.0000	Q4,5
1118-00121	10A S2800A	1.0000	CR2
1119-00121	200V FULL WAVE BR MDA 920A-4	1.0000	CR9
1121-00198	LM 323K POS VOLT REG sub [illegible]	1.0000	IC37
1121-00219	LM 340K15 POS VOLT REG	1.0000	IC36
1121-00240	LM 555 CN TIMER	1.0000	IC1
1122-00128	DM 7404 HEX INVERTER	1.0000	IC4
1122-00156	SN 7408 QUAD 2IN AND GATE	1.0000	IC24
1122-00289	DM 74125N TRI STATE QUAD BUFF	3.0000	IC21,22 IC23
1122-00345	DM 74165N 8 BIT PAR IN SER OU	2.0000	IC10 IC13
1122-00359	DM 74177N PRESET BINARY COUN	1.0000	IC8
1122-00380	SN 74LS00N QUAD 2IN NAND GATE	3.0000	IC5,6,7
1122-00436	SN 74LS93N 4 BIT NINARY CNTR	3.0000	IC9 IC11,12
1122-00450	SN 74LS95N 4 BIT SHIFT REG	1.0000	IC3
1122-00595	DM 8123 TRI ST QUAD 2IN DAS	2.0000	IC2 IC14
1122-00758	3205 DECODER 1 OUT OF 8	1.0000	IC27
1122-00765	* 4002-1 RAM 320 BIT **	2.0000	IC17,18
1122-00779	* 4004 MICROPROCESSOR **	1.0000	IC16
1122-00786	* 4008 ADDRESS LATCH **	1.0000	IC26
1122-00793	* 4009 I/O CONTROL **	1.0000	IC25
1122-00800	* 4201 CLOCK GENERATOR **	1.0000	IC15
1122-00807	* 1702A PROM 2K **	4.0000	IC32-35
1124-00100	CTS MP051 CRYSTALS 5.185MHZ	1.0000	XTL1
1130-00100	DIP SWITCH 2 POS SPST	1.0000	S2
1130-00128	DIP SWITCH 10POS SPST	1.0000	S1
1130-00135	DIP SWITCH 10POS COVER	1.0000	S1
1138-00135	6053B HEAT SINK	1.0000	IC36
1138-00149	6054B TO-3 HEAT SINK	1.0000	IC37
1139-00114	24 RED A-3504-03	AS REQUIRED	
1139-00314	22 BUS BARE 8021-100	AS REQUIRED	
1140-00179	20 COND FLAT JUMPER CABLE	1.0000	J1
1142-00233	ICN 246-S4 24 PIN IC SKT	8.0000	SEE ASSY
1142-00247	ICN 163-53 16 PIN IC SKT	4.0000	IC15-18
1142-00345	AMP SOCKET CONTACT 60617-1	1.0000	J2
1157-00114	HEAT SHRINK 1/2 BLK	AS REQUIRED	
1159-00121	15 DL .156 DIP PC .380LG	1.0000	XA1
1161-00099	1 CKT AMP SKT HOUSING 480349-0	1.0000	J2
1161-00156	8 PIN MOLEX RCPT 09-65-1081	1.0000	J4A

PART	ASSY DESC	U/M	NS	QTY			
7405-00148	ANALOG AMP 5800	1000848	7405				
1001-00212	MCH SLT BND 6-32 .31 STLCAD	AS REQUIRED	2	REQ			
1025-00114	NUT KEP 6-32 CADPLT	AS REQUIRED	2	REQ			
1102-00149	0.47 MF 100 POLYCARB	3.0000	C1,2	C13			
1102-00170	3.3 MF 100 10 POLYCARB	1.0000	C10				
1102-00177	4.7 MF 100 POLYCARB	2.0000	C11,12				
1103-00107	1 MF 35 20 SPR 196D	7.0000	SEE	ASSY			
1103-00163	10 MF 20 10 SPR 196D	1.0000	C14				
1103-00240	68 MF 16 +50 AL ELEC	1.0000	C9				
1103-00254	150 MF 6 20 SPR 196D	1.0000	C25				
1104-00114	33 PF 1000 20 SPR-5GA	6.0000	C3-8				
1104-00121	47 PF 1000 20 SPR-10TCC	1.0000	C24				
1104-00205	0.01 MF 100 20 SPR-TG	2.0000	C23	C26			
1108-00179	200 OHM RN60C 1%	1.0000	R55				
1108-00279	2.21 K RN60C 1%	1.0000	R61				
1108-00313	4.99 K RN60C 1%	3.0000	R54	R56	R59		
1108-00333	8.06 K RN60C 1%	1.0000	R15				
1108-00346	11.0 K RN60C 1%	1.0000	R60				
1108-00400	40.2 K RN60C 1%	1.0000	R58				
1108-00504	475 K RN60C 1%	1.0000	R23				
1108-00535	1.00 M RN60C 1%	1.0000	R12				
1108-00570	100 OHM RN55C 1%	1.0000	R28				
1108-00577	182 OHM RN55C 1%	1.0000	R36				
1108-00626	4.75 K RN55C 1%	1.0000	R14				
1110-00142	2.00 K 1.00% 10 0.10	1.0000	R19				
1110-00184	11.5 K 1.00% 10 0.10	1.0000	R27				
1110-00191	12.4 K 1.00% 10 0.10	1.0000	R29				
1110-00198	20.0 K 1.00% 10 0.10	1.0000	R22				
1111-00102	3.3 OHM 5% 1/4W	1.0000	R62				
1111-00123	24 OHM 5% 1/4W	1.0000	R64				
1111-00154	470 OHM 5% 1/4W	1.0000	R53				
1111-00155	510 OHM 5% 1/4W	1.0000	R63				
1111-00170	2.2 K 5% 1/4W	3.0000	R35	R37,38			
1111-00174	3.3 K 5% 1/4W	4.0000	SEE	ASSY			
1111-00178	4.7 K 5% 1/4W	3.0000	R32	R40	R46		
1111-00184	8.2 K 5% 1/4W	1.0000	R20				
1111-00186	10 K 5% 1/4W	2.0000	R49,50				
1111-00188	12 K 5% 1/4W	1.0000	R52				
1111-00190	15 K 5% 1/4W	3.0000	R16	R34	R51		
1111-00194	22 K 5% 1/4W	1.0000	R31				
1111-00198	33 K 5% 1/4W	1.0000	R41				

1111-00200	39 K	5% 1/4W			2.0000	R13 R42
1111-00210	100 K	5% 1/4W			5.0000	SEE ASSY
1111-00218	220 K	5% 1/4W			2.0000	R18 R21
1111-00242	2.2 M	5% 1/4W			1.0000	R39
1111-00250	4.7 M	5% 1/4W			2.0000	R17 R44
1113-00184	200 OHM	END PC	15	CER	1.0000	R6
1113-00205	500 OHM	TOP PC	1	CER	1.0000	R9
1113-00310	5 K	END PC	15	CER	1.0000	R8
1113-00380	20 K	END PC	15	CER	2.0000	R5 R7
1113-00394	50 K	TOP PC	1	CER	2.0000	R1,2
1113-00443	100 K	TOP PC	1	CER	1.0000	R3
1113-00464	100 K	END PC	15	CER	1.0000	R4
1117-00128	NPN	LOW LEVEL AMP		2N 3565	2.0000	Q14 Q26
1117-00163	PNP	MED POWER		2N 3740	1.0000	Q33
1117-00226	NPN	SATURATED SW		2N 5134	7.0000	SEE ASSY
1117-00240	PNP	G.P. AMP + SW		2N 5139	6.0000	SEE ASSY
1117-00261	N-CH	JFET		2N 5458	13.0000	SEE ASSY
1117-00268	P-CH	JFET		2N5460	1.0000	Q18
1117-00282	NPN	LOW NOISE AMP		2N 5962	2.0000	Q27 Q29
1121-00107	LM 301 AH	OPERATIONAL AMP			1.0000	IC2
1121-00135	LM 305 H	VOLTAG REGULATOR			1.0000	IC10
1121-00142	LM 308AH	OPERATIONAL AMP			4.0000	IC1 IC3-5
1121-00149	LM 308	MATCHED PAIR OPAMP			1.0000	IC6,7
1121-00184	LM 320MP15	NEG VOLT REG			2.0000	IC12,13
1121-00212	LM 340T15	POS VOLT REG			2.0000	IC8,9
1121-00233	LM 342P24	POS VOLT REG			1.0000	IC11
1139-00314	22	BUS BARE		8021-100	AS REQUIRED	
1143-00177	7	3/8 FEED			1.0000	TB1
1149-00107	MP 221	AMPLIFIER			1.0000	A1
1403-00148	ANALOG-AMP			1000847	1.0000	PWP

PART	ASSY DESC	U/M	NS	QTY	
9511-00100	5800 MKIV-2 STD COUNTING		9511		
1001-00163	MCH SLT BND 4-40 .38 STLCAD			AS REQUIRED	
1001-00215	MCH SLT BND 6-32 .38 STLCAD			AS REQUIRED	
1001-00855	MCH SLT FLT 8-32 .50 STLCAD			AS REQUIRED	
1001-01228	MCH SLT PAN 4-40 .62 STL X			AS REQUIRED	
1001-01266	MCH SLT PAN 6-32 .38 STLCAD			AS REQUIRED	
1001-02171	MCH PHL FLT 6-32 .75 STLCAD			AS REQUIRED 2	REQUIRED
1001-02598	MCH PHL PAN 6-32 .25 STLCAD			AS REQUIRED 2	REQUIRED
1006-00275	LLK 8-32 .50			AS REQUIRED	
1006-00351	LLK 8-32 .88			4.0000	
1007-00140	CAP HXS PLN 1/4-20 1.25 STLCAD			AS REQUIRED 2	REQUIRED
1007-00183	CAP HXS PLN 1/4-28 .50 STLCAD			AS REQUIRED	
1007-00813	CAP HXS FLT 1/4-20 .62 STLCAD			AS REQUIRED	
1007-00855	CAP HXS FLT 1/4-28 .75 STLCAD			AS REQUIRED	
1011-03242	SET HXS DOG 6-32 .50 STLPLN			AS REQUIRED 2	REQUIRED
1020-00122	NUT HEX 6-32 .25 STLCAD			AS REQUIRED 2	REQUIRED
1025-00107	NUT KEP 4-40 CADPLT			AS REQUIRED	
1025-00114	NUT KEP 6-32 CADPLT			AS REQUIRED	
1025-00125	NUT KEP 8-32 CADPLT			AS REQUIRED	
1029-00107	WASHER FLT STL CAD 6			AS REQUIRED	
1031-00128	WASHER INT TOOTH CAD 6			AS REQUIRED	
1031-00156	WASHER INT TOOTH STL CAD 8			AS REQUIRED	
1044-00107	SPACER AMATON HEX 8Z10-A0632-0			AS REQUIRED	
1044-00303	SPCR RICHLOK 1/4 CRS-4R			16.0000	
1066-00205	CTG4 2LB L.C.BRIDGE 1001441			1.0000	
1066-00219	CTG4 2LB UPRIGHT 1001446			1.0000	
1066-00233	CTG4 2LB TOL RING 1001546			1.0000	
1066-00247	PLATTER ADAPTER			1.0000	
1067-00107	CTG4 ANALOG BKT 1000922			1.0000	
1067-00114	CTG4 BKT SPG RET 1000923			1.0000	
1067-00282	BCKT ANGLE SUP CTG4 1001413			1.0000	
1069-00835	CTG1 GUIDE PLT 2&10 1000586			1.0000	
1069-00886	CTG4 DUST COVER CLR 1001076			1.0000	
1069-00892	CTG4 PAINTED BOT 1000600-02			1.0000	
1069-00899	CTG4 PAINTED TOP 1000601-02			1.0000	
1069-00919	CTG4 DSPY BKT L/H 1000805			1.0000	
1069-00926	CTG4 DSPY BKT R/H 1000806			1.0000	
1069-00940	CTG4 COV PLATE I/O 1000849			1.0000	
1070-00282	LBL SER TAG 1001075A			1.0000	
1070-00296	LBL GR NET TST 5800 1001224			1.0000	
1070-00303	LBL FUSE DATA 1001225			1.0000	
1070-00394	CTG4 FRT PANEL 1000607			1.0000	
1070-00750	LABEL CAPACITY 2LB 5800/5810			1.0000	

9511-00100		5800 MKIV-2 (con't)		
1074-00191		CBL TY PNDT	SST-25-MP	AS REQUIRED
1075-00142		PAD RUB 3M GRY	SJ-5023	AS REQUIRED
1106-00128		CUSTOM TRANSFORMER 5800 MKIV		1.0000
1125-00121		LINE FILTER 3EF1 RECPT 3A		1.0000
1127-00135		2 POS MAN 10A BLK ROCKER DPDT		1.0000
1134-00163		2 MDL 1/4X1 1/4 SLOW		1.0000
1140-00226		PWR CORD 8FT 18AWG RECPT&PLUG		1.0000
1142-00317		FUSE HOLDER HKP		1.0000
1142-00338		MOLEX PINS 08-50-0106		21.0000
1143-00310		LUG,RING 22-18AWG #10STUD NI		AS REQUIRED
1147-00212		OPERATOR MAN CTG4 TL-813		1.0000
1161-00205		21PIN MOLEX PLUG 09-50-3211		1.0000
1161-00212		KEY MOLEX POL KEY W/POST		1.0000
7153-00766		MK 111A 2 0.015 CNTG AL		1.0000
7200-00163	A	CTG4 2LB PLATTER ASSY		1.0000
7405-00146	A	DISPLAY 5800	1000842	1.0000
7405-00147	A	DIG CONTROL 5800	1000842	1.0000
7405-00148	A	ANALOG AMP 5800	1000848	1.0000

PART	ASSY DESC				U/M	NS	QTY		
9511-00107	5800 MKIV-10 STD COUNTING					9511			
1001-00163	MCH SLT BND	4-40	.38	STLCAD			AS REQUIRED		
1001-00215	MCH SLT BND	6-32	.38	STLCAD			AS REQUIRED		
1001-00855	MCH SLT FLT	8-32	.50	STLCAD			AS REQUIRED		
1001-01228	MCH SLT PAN	4-40	.62	STL X			AS REQUIRED		
1001-01266	MCH SLT PAN	6-32	.38	STLCAD			AS REQUIRED		
1001-03117	CAP HXS BLK	6-32	.88	STLCAD			AS REQUIRED	1	REQUIRED
1006-00275	LLK	8-32	.50				AS REQUIRED		
1006-00351	LLK	8-32	.88				4.0000		
1007-00140	CAP HXS PLN	1/4-20	1.25	STLCAD			AS REQUIRED	2	REQUIRED
1007-00183	CAP HXS PLN	1/4-28	.50	STLCAD			AS REQUIRED		
1007-00807	CAP HXS FLT	1/4-20	.50	STLCAD			AS REQUIRED	1	REQUIRED
1007-00813	CAP HXS FLT	1/4-20	.62	STLCAD			AS REQUIRED		
1007-00855	CAP HXS FLT	1/4-28	.75	STLCAD			AS REQUIRED		
1011-03242	SET HXS DOG	6-32	.50	STLPLN			AS REQUIRED	2	REQUIRED
1020-00122	NUT HEX	6-32	.25	STLCAD			AS REQUIRED	2	REQUIRED
1025-00107	NUT KEP 4-40			CADPLT			AS REQUIRED		
1025-00114	NUT KEP 6-32			CADPLT			AS REQUIRED		
1025-00125	NUT KEP 8-32			CADPLT			AS REQUIRED		
1029-00107	WASHER FLT STL CAD 6						AS REQUIRED		
1031-00128	WASHER INT TOOTH CAD 6						AS REQUIRED		
1031-00156	WASHER INT TOOTH STL CAD 8						AS REQUIRED		
1044-00107	SPACER AMATON HEX 8Z10-A0632-0						AS REQUIRED		
1044-00303	SPCR RICHLOK 1/4			CBS-4R			16.0000		
1066-00184	CTG4 10LB SPRING PAD			1001381			1.0000		
1066-00191	CTG4 10LB SPRING RET			1001380			1.0000		
1066-00198	CTG4 10LB PLT ADPTR			1001440			1.0000		
1066-00212	CTG4 10LB L.C.BRIDGE			1001442			1.0000		
1067-00107	CTG4 ANALOG BKT			1000922			1.0000		
1067-00114	CTG4 BKT SPG RET			1000923			1.0000		
1067-00282	BCKT ANGLE SUP CTG4			1001413			1.0000		
1068-00142	SPRN			LC-032-C-9-MW			1.0000		
1069-00886	CTG4 DUST COVER CLR			1001076			1.0000		
1069-00892	CTG4 PAINTED BOT			1000600-02			1.0000		
1069-00899	CTG4 PAINTED TOP			1000601-02			1.0000		
1069-00919	CTG4 DSPY BKT L/H			1000805			1.0000		
1069-00926	CTG4 DSPY BKT R/H			1000806			1.0000		
1069-00940	CTG4 COV PLATE I/O			1000849			1.0000		

9511-00107	5800 MKIV-10 (con't)		
1070-00282	LBL SER TAG	1001075A	1.0000
1070-00296	LBL GR NET TST 5800	1001224	1.0000
1070-00303	LBL FUSE DATA	1001225	1.0000
1070-00394	CTG4 FRT PANEL	1000607	1.0000
1070-00749	LABEL CAPACITY 10LB 5800/5810		1.0000
1074-00163	CBL MT PNDT	MABMS-A-M	AS REQUIRED
1074-00191	CBL TY PNDT	SST-25-MP	AS REQUIRED
1075-00142	PAD RUB 3M GRY	SJ-5023	AS REQUIRED
1106-00128	CUSTOM TRANSFORMER 5800 MKIV		1.0000
1125-00121	LINE FILTER 3EF1 RECPT 3A		1.0000
1127-00135	2 POS MAN 10A BLK ROCKER DPDT		1.0000
1134-00163	2 MDL 1/4X1 1/4 SLOW		1.0000
1140-00226	PWR CORD 8FT 18AWG RECPT&PLUG		1.0000
1142-00317	FUSE HOLDER HKP		1.0000
1142-00338	MOLEX PINS 08-50-0106		21.0000
1143-00310	LUG,RING 22-18AWG #10STUD NI		AS REQUIRED
1147-00212	OPERATOR MAN CTG4 TL-813		1.0000
1161-00205	21PIN MOLEX PLUG 09-50-3211		1.0000
1161-00212	KEY MOLEX POL KEY W/POST		1.0000
7200-00156	A CTG4 PLATTER ASSY 10LB		1.0000
7405-00146	A DISPLAY 5800	1000842	1.0000
7405-00147	A DIG CONTROL 5800	1000842	1.0000
7405-00148	A ANALOG AMP 5800	1000848	1.0000

PART	ASSY	DESC			U/M	NS	QTY	
9511-00114		5800 MKIV-25 STD COUNTING				9511		
1001-00163		MCH SLT BND	4-40	.38 STLCAD		AS REQUIRED	4	REQUIRED
1001-00215		MCH SLT BND	6-32	.38 STLCAD		AS REQUIRED	5	REQUIRED
1001-00855		MCH SLT FLT	8-32	.50 STLCAD		AS REQUIRED	4	REQUIRED
1001-01228		MCH SLT PAN	4-40	.62 STL X		AS REQUIRED	4	REQUIRED
1001-01266		MCH SLT PAN	6-32	.38 STLCAD		AS REQUIRED	8	REQUIRED
1005-00275		LLK	8-32	.50		AS REQUIRED	4	REQUIRED
1006-00351		LLK	8-32	.88			4.0000	
1007-00183		CAP HXS PLN	1/4-28	.50 STLCAD		AS REQUIRED	2	REQUIRED
1007-00813		CAP HXS FLT	1/4-20	.62 STLCAD		AS REQUIRED	1	REQUIRED
1007-00855		CAP HXS FLT	1/4-28	.75 STLCAD		AS REQUIRED	2	REQUIRED
1025-00107		NUT KEP 4-40		CADPLT		AS REQUIRED	10	REQUIRED
1025-00114		NUT KEP 6-32		CADPLT		AS REQUIRED	1	REQUIRED
1025-00125		NUT KEP 8-32		CADPLT		AS REQUIRED	4	REQUIRED
1029-00107		WASHER FLT STL CAD 6				AS REQUIRED	4	REQUIRED
1031-00128		WASHER INT TOOTH CAD 6				AS REQUIRED	12	REQUIRED
1031-00156		WASHER INT TOOTH STL CAD 8				AS REQUIRED	1	REQUIRED
1044-00107		SPACER AMATON HEX 8710-A0632-0				AS REQUIRED	1	REQUIRED
1044-00303		SPCR RICHLOK 1/4		CBS-4R			16.0000	
1066-00115		CTG4 MACH SPIDER		1000802-02			1.0000	
1067-00107		CTG4 ANALOG BKT		1000922			1.0000	
1067-00114		CTG4 BKT SPG RET		1000923			1.0000	
1067-00282		BCKT ANGLE SUP CTG4		1001413			1.0000	
1069-00886		CTG4 DUST COVER CLR		1001076			1.0000	
1069-00892		CTG4 PAINTED BOT		1000600-02			1.0000	
1069-00899		CTG4 PAINTED TOP		1000601-02			1.0000	
1069-00919		CTG4 DSPY BKT L/H		1000805			1.0000	
1069-00926		CTG4 DSPY BKT R/H		1000806			1.0000	
1069-00933		CTG4 L.C. SUPPORT		1000838			1.0000	
1069-00940		CTG4 COV PLATE I/O		1000849			1.0000	
1070-00282		LBL SER TAG		1001075A			1.0000	
1070-00296		LBL GR NET TST 5800		1001224			1.0000	
1070-00303		LBL FUSE DATA		1001225			1.0000	
1070-00394		CTG4 FRT PANEL		1000607			1.0000	
1070-00748		LABEL CAPACITY	25LB	5800/5810			1.0000	
1074-00163		CBL MT PNDT		MABMS-A-M		AS REQUIRED	1	REQUIRED
1074-00191		CBL TY PNDT		SST-25-MP		AS REQUIRED	1	REQUIRED
1075-00142		PAD RUB 3M GRY		SJ-5023		AS REQUIRED	4	REQUIRED
1076-00114		CTG4 PLATTER		1000807			1.0000	

9511-00114	5800 MKIV-25 (con't)			
1085-00100	WRNCH SHPT HEX 532	1.0000		
1106-00128	CUSTOM TRANSFORMER 5800 MKIV	1.0000		
1125-00121	LINE FILTER 3EF1 RECPT 3A	1.0000		
1127-00135	2 POS MAN 10A BLK ROCKER DPDT	1.0000		
1134-00163	2 MDL 1/4X1 1/4 SLOW	1.0000		
1140-00226	PWR CORD 8FT 18AWG RECPT&PLUG	1.0000		
1142-00317	FUSE HOLDER HKP	1.0000		
1142-00338	MOLEX PINS 08-50-0106	21.0000		
1143-00310	LUG,RING 22-18AWG #10STUD NI	AS REQUIRED	1	REQUIRED
1147-00212	OPERATOR MAN CTG4 TL-813	1.0000		
1153-00149	MK 1A 25 0.015 CNTG	1.0000		
1161-00205	21PIN MOLEX PLUG 09-50-3211	1.0000		
1161-00212	KEY MOLEX POL KEY W/POST	1.0000		
7405-00146	A DISPLAY 5800 1000842	1.0000		
7405-00147	A DIG CONTROL 5800 1000842	1.0000		
7405-00148	A ANALOG AMP 5800 1000848	1.0000		
:				

PART	ASSY DESC				U/M	NS	QTY	
9511-00121	5800 MKIV-50 STD COUNTING					9511		
1001-00163	MCH SLT BND	4-40	.38	STLCAD		AS REQUIRED	4	REQUIRED
1001-00215	MCH SLT BND	6-32	.38	STLCAD		AS REQUIRED	5	REQUIRED
1001-00855	MCH SLT FLT	8-32	.50	STLCAD		AS REQUIRED	4	REQUIRED
1001-01223	MCH SLT PAN	4-40	.62	STL X		AS REQUIRED	4	REQUIRED
1001-01265	MCH SLT PAN	6-32	.38	STLCAD		AS REQUIRED	8	REQUIRED
1006-00275	LLK	8-32	.50			AS REQUIRED	4	REQUIRED
1006-00351	LLK	8-32	.88				4.0000	
1007-00183	CAP HXS PLN	1/4-28	.50	STLCAD		AS REQUIRED	2	REQUIRED
1007-00813	CAP HXS FLT	1/4-20	.62	STLCAD		AS REQUIRED	1	REQUIRED
1007-00855	CAP HXS FLT	1/4-28	.75	STLCAD		AS REQUIRED	2	REQUIRED
1025-00107	NUT KEP 4-40			CADPLT		AS REQUIRED	10	REQUIRED
1025-00114	NUT KEP 6-32			CADPLT		AS REQUIRED	1	REQUIRED
1025-00125	NUT KEP 8-32			CADPLT		AS REQUIRED	4	REQUIRED
1029-00107	WASHER FLT STL CAD 6					AS REQUIRED	4	REQUIRED
1031-00128	WASHER INT TOOTH CAD 6					AS REQUIRED	12	REQUIRED
1031-00156	WASHER INT TOOTH STL CAD 8					AS REQUIRED	1	REQUIRED
1044-00107	SPACER AMATON HEX 8710-A0632-0					AS REQUIRED	1	REQUIRED
1044-00303	SPCR RICHLOK 1/4			CBS-4R			16.0000	
1066-00115	CTG4 MACH SPIDER			1000802-02			1.0000	
1067-00107	CTG4 ANALOG BKT			1000922			1.0000	
1067-00114	CTG4 BKT SPG RET			1000923			1.0000	
1067-00282	BCKT ANGLE SUP CTG4			1001413			1.0000	
1069-00886	CTG4 DUST COVER CLR			1001076			1.0000	
1069-00892	CTG4 PAINTED BOT			1000600-02			1.0000	
1069-00899	CTG4 PAINTED TOP			1000601-02			1.0000	
1069-00919	CTG4 DSPY BKT L/H			1000805			1.0000	
1069-00926	CTG4 DSPY BKT R/H			1000806			1.0000	
1069-00933	CTG4 L.C. SUPPORT			1000838			1.0000	
1069-00940	CTG4 COV PLATE I/O			1000849			1.0000	
1070-00282	LBL SER TAG			1001075A			1.0000	
1070-00296	LBL GR NET TST 5800			1001224			1.0000	
1070-00303	LBL FUSE DATA			1001225			1.0000	
1070-00394	CTG4 FRT PANEL			1000607			1.0000	
1070-00747	LABEL CAPACITY 50LB 5800/5810						1.0000	
1074-00163	CBL MT PNDT			MABMS-A-M		AS REQUIRED	1	REQUIRED
1074-00191	CBL TY PNDT			SST-25-MP		AS REQUIRED	1	REQUIRED
1075-00142	PAD RUB 3M GRY			SJ-5023		AS REQUIRED	4	REQUIRED

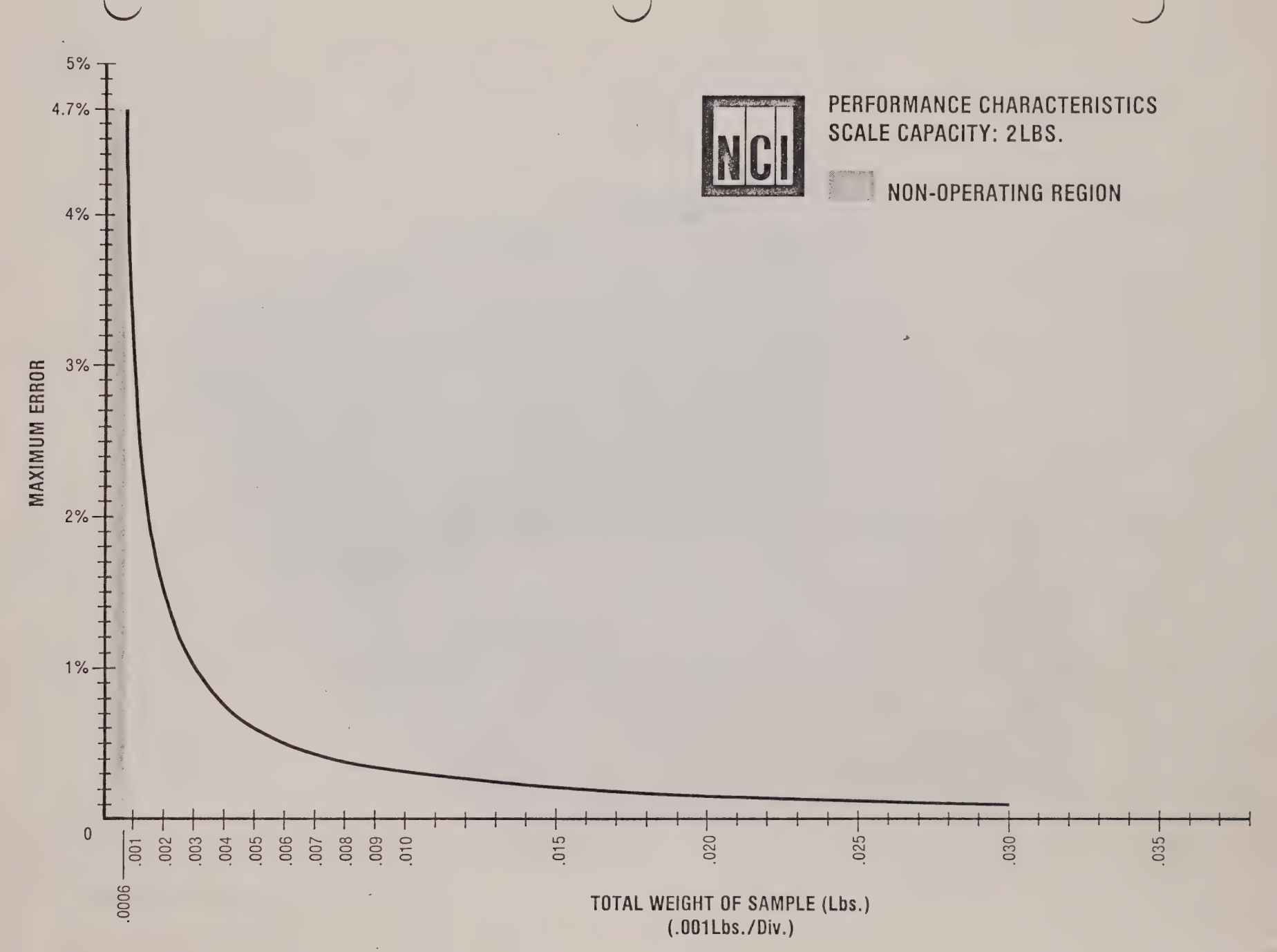
9511-00121	5800 MKIV-50 (con't)			
1076-00114	CTG4 PLATTER	1000807	1.0000	
1085-00160	WRNCH SHRT HEX	532	1.0000	
1106-00128	CUSTOM TRANSFORMER 5800 MKIV		1.0000	
1125-00121	LINE FILTER 3EF1 RECPT	3A	1.0000	
1127-00135	2 POS MAN 10A BLK ROCKER DPDT		1.0000	
1134-00163	2 MDL 1/4X1 1/4 SLOW		1.0000	
1140-00226	PWR CORD 8FT 18AWG RECPT&PLUG		1.0000	
1142-00317	FUSE HOLDER HKP		1.0000	
1142-00338	MOLEX PINS 08-50-0106		21.0000	
1143-00310	LUG,RING 22-18AWG #10STUD NI		AS REQUIRED 1	REQUIRED
1147-00212	OPERATOR MAN CTG4 TL-813		1.0000	
1153-00177	MK 1A 50 0.015 CNTG		1.0000	
1161-00205	21PIN MOLEX PLUG 09-50-3211		1.0000	
1161-00212	KEY MOLEX POL KEY W/POST		1.0000	
7405-00146	A DISPLAY 5800	1000842	1.0000	
7405-00147	A DIG CONTROL 5800	1000842	1.0000	
7405-00148	A ANALOG AMP 5800	1000848	1.0000	

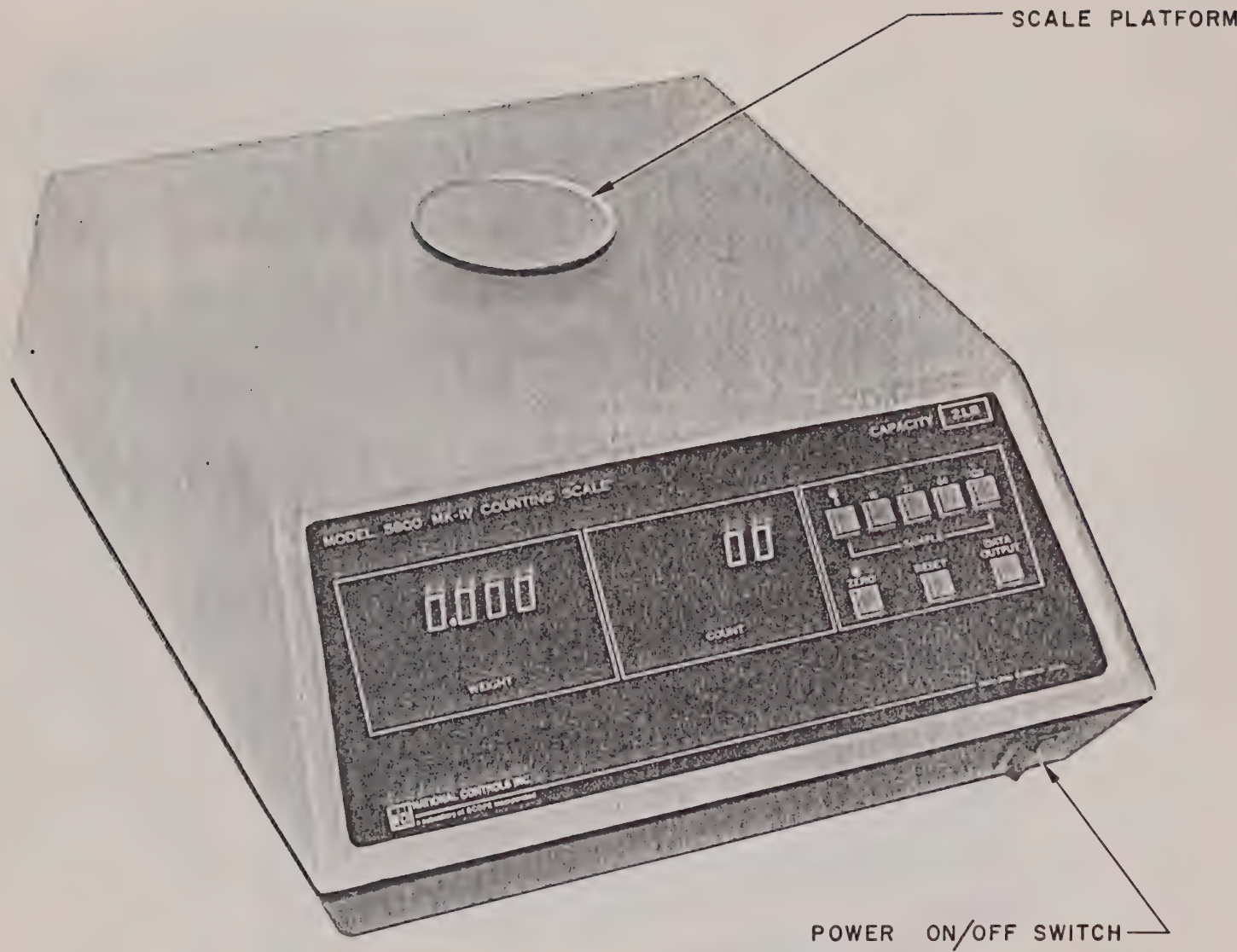
PART	ASSY DESC			U/M	NS	QTY	
9511-00128	5800 MKIV-100 ST. COUNTING					9511	
1001-00163	MCH SLT BND	4-40	.38 STLCAD			AS REQUIRED 4	REQUIRED
1001-00215	MCH SLT BND	6-32	.38 STLCAD			AS REQUIRED 5	REQ
1001-00855	MCH SLT FLT	8-32	.50 STLCAD			AS REQUIRED 4	REQ
1001-01228	MCH SLT PAN	4-40	.62 STL X			AS REQUIRED 4	REQ
1001-01266	MCH SLT PAN	6-32	.38 STLCAD			AS REQUIRED 8	REQ
1006-00275	LLK	8-32	.50			AS REQUIRED 4	REQ
1006-00351	LLK	8-32	.88			4.0000	
1007-00183	CAP HXS PLN	1/4-28	.50 STLCAD			AS REQUIRED 2	REQUIRED
1007-00813	CAP HXS FLT	1/4-20	.62 STLCAD			AS REQUIRED 1	REQUIRED
1007-00855	CAP HXS FLT	1/4-28	.75 STLCAD			AS REQUIRED 2	REQUIRED
1025-00107	NUT KEP 4-40		CADPLT			AS REQUIRED 10	REQUIRED
1025-00114	NUT KEP 6-32		CADPLT			AS REQUIRED 1	REQUIRED
1025-00125	NUT KEP 8-32		CADPLT			AS REQUIRED 4	REQUIRED
1029-00107	WASHER FLT STL CAD 6					AS REQUIRED 4	REQUIRED
1031-00128	WASHER INT TOOTH CAD 6					AS REQUIRED 12	REQUIRED
1031-00156	WASHER INT TOOTH STL CAD 8					AS REQUIRED 1	REQUIRED
1044-00107	SPACER AMATON HEX 8Z10-A0632-0					AS REQUIRED 1	REQUIRED
1044-00303	SPCR RICHLOK 1/4		CBS-4R			16.0000	
1066-00115	CTG4 MACH SPIDER		1000802-02			1.0000	
1067-00107	CTG4 ANALOG BKT		1000922			1.0000	
1067-00114	CTG4 BKT SPG RET		1000923			1.0000	
1067-00282	BCKT ANGLE SUP CTG4		1001413			1.0000	
1069-00886	CTG4 DUST COVER CLR		1001076			1.0000	
1069-00892	CTG4 PAINTED BOT		1000600-02			1.0000	
1069-00899	CTG4 PAINTED TOP		1000601-02			1.0000	
1069-00919	CTG4 DSPY BKT L/H		1000805			1.0000	
1069-00926	CTG4 DSPY BKT R/H		1000806			1.0000	
1069-00933	CTG4 L.C. SUPPORT		1000838			1.0000	
1069-00940	CTG4 COV PLATE I/O		1000849			1.0000	
1070-00282	LBL SER TAG		1001075A			1.0000	
1070-00296	LBL GR NET TST 5800		1001224			1.0000	
1070-00303	LBL FUSE DATA		1001225			1.0000	
1070-00394	CTG4 FRT PANEL		1000607			1.0000	
1070-00746	LABEL CAPACITY 100LB		5800/5810			1.0000	
1074-00163	CBL MT PNDT		MABMS-A-M			AS REQUIRED 1	REQUIRED
1074-00191	CBL TY PNDT		SST-25-MP			AS REQUIRED 1	REQUIRED
1075-00142	PAD RUB 3M GRY		SJ-5023			AS REQUIRED 4	REQUIRED

1076-00114		CTG4 PLATTER	1000807		1.0000	
1085-00100		WRNCH SHRT HEX	532		1.0000	
1106-00128		CUSTOM TRANSFORMER 5800 MKIV			1.0000	
1125-00121		LINE FILTER 3EF1 RECPT	3A		1.0000	
1127-00135		2 POS MAN 10A BLK ROCKER DPDT			1.0000	
1134-00163		2 MDL 1/4X1 1/4 SLOW			1.0000	
1140-00226		PWR CORD 8FT 18AWG RECPT&PLUG			1.0000	
1142-00317		FUSE HOLDER HKP			1.0000	
1142-00338		MOLEX PINS 08-50-0106			21.0000	
1143-00310		LUG,RING 22-18AWG #10STUD NI		AS REQUIRED	1	REQUIRED
1147-00212		OPERATOR MAN CTG4 TL-813			1.0000	
1153-00205		MK 1A 100 0.015 CNTG			1.0000	
1161-00205		21PIN MOLEX PLUG 09-50-3211			1.0000	
1161-00212		KEY MOLEX POL KEY W/POST			1.0000	
7405-00146	A	DISPLAY 5800	1000842		1.0000	
7405-00147	A	DIG CONTROL 5800	1000842		1.0000	
7405-00148	A	ANALOG AMP 5800	1000848		1.0000	

SECTION XI

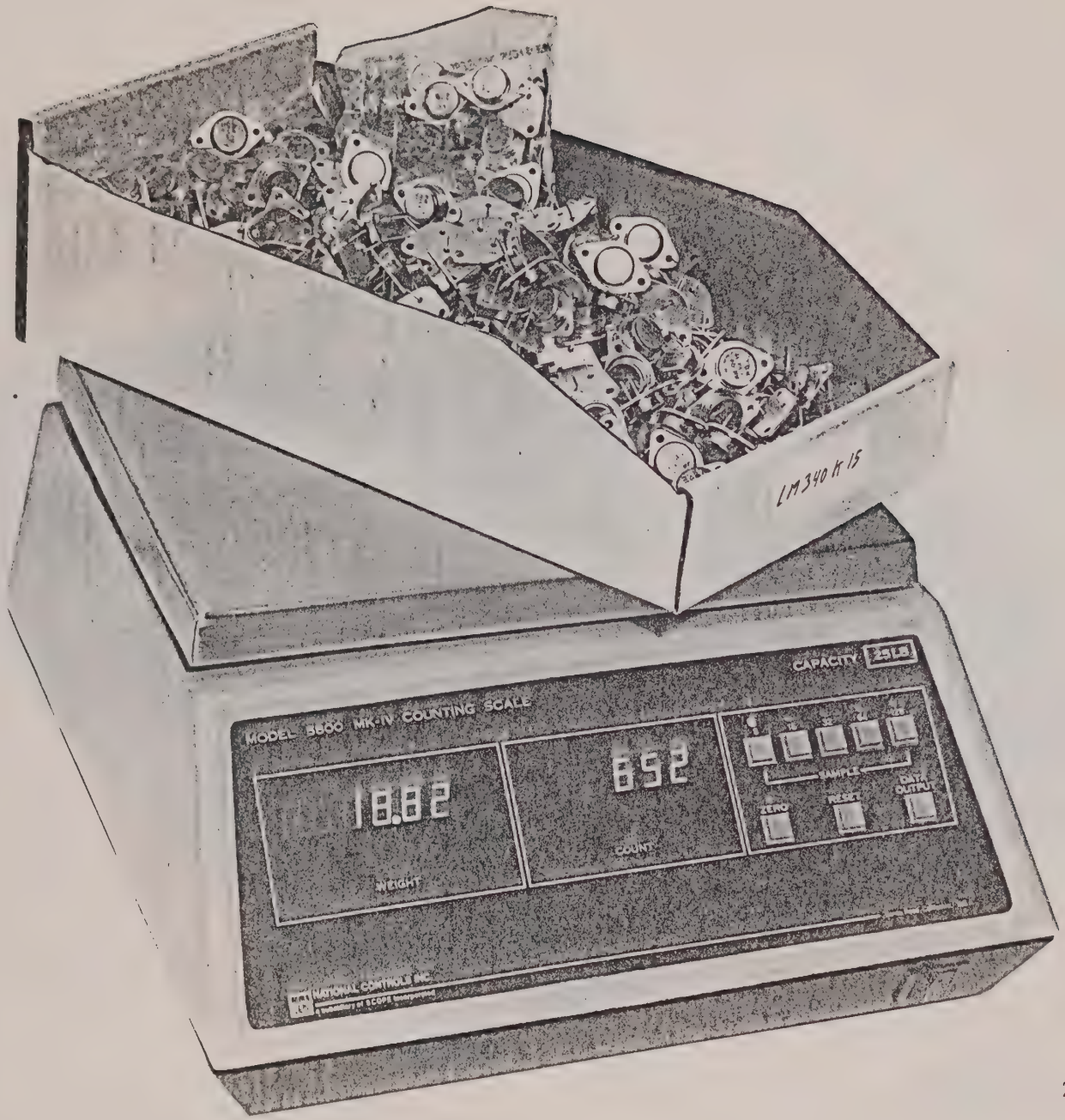
SCHEMATICS


PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 2LBS.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.0006
.001
.002
.003
.004
.005
.006
.007
.008
.009
.010
.015
.020
.025
.030
.035
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.001Lbs./Div.)



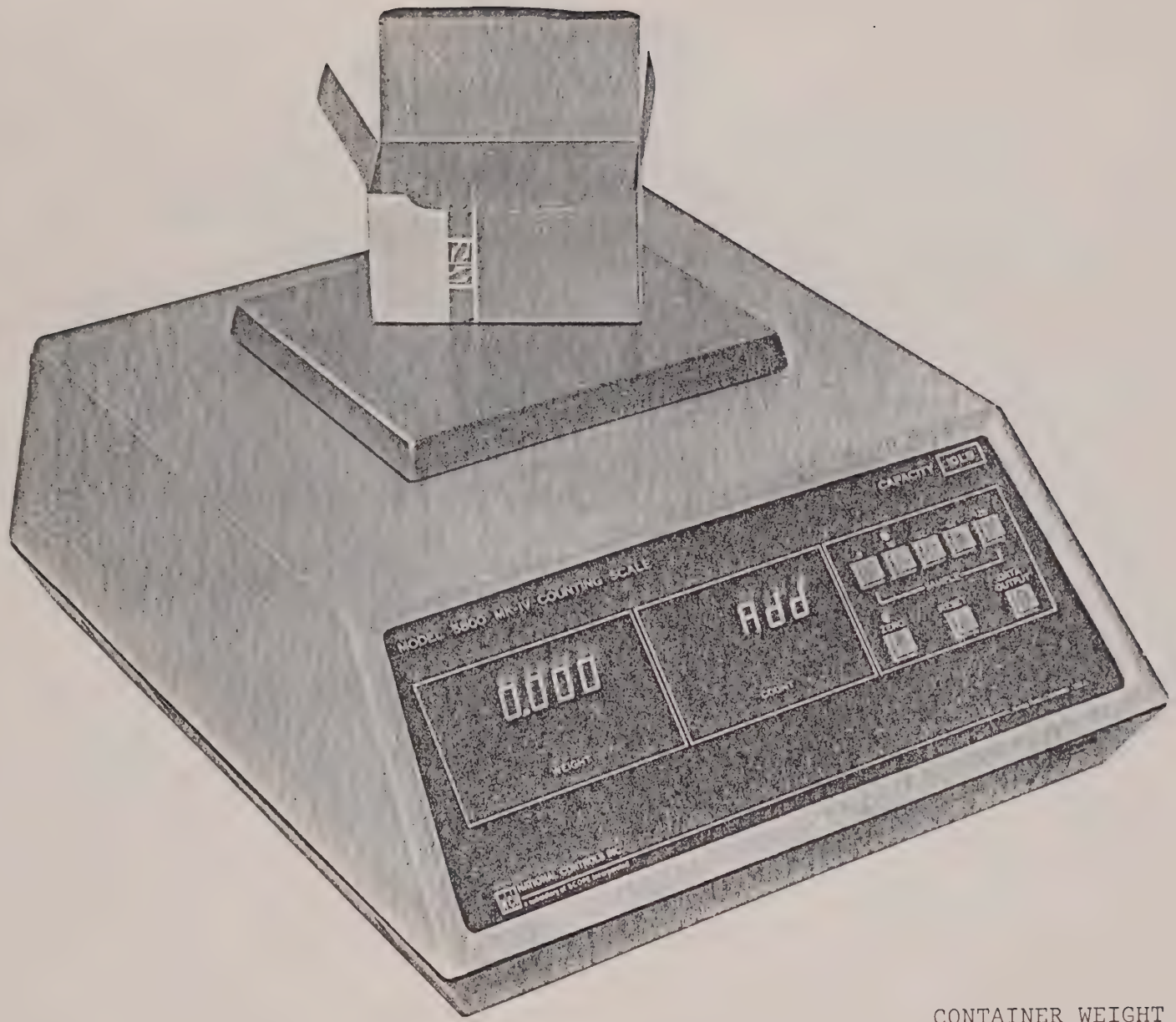
2 POUND CAPACITY
CONFIGURATION

Figure 4.1



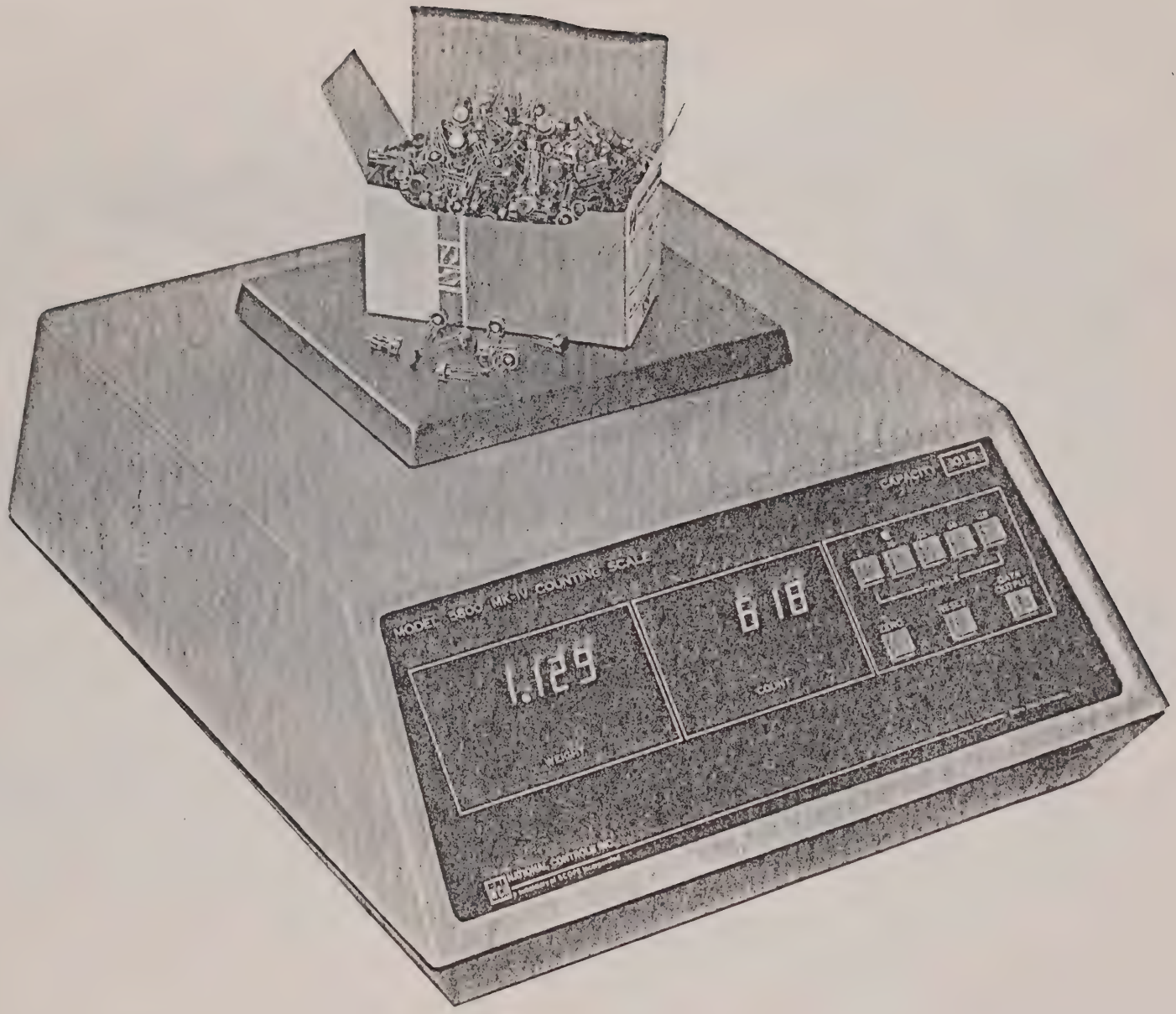
25 POUND CAPACITY
CONFIGURATION

Figure 4.2



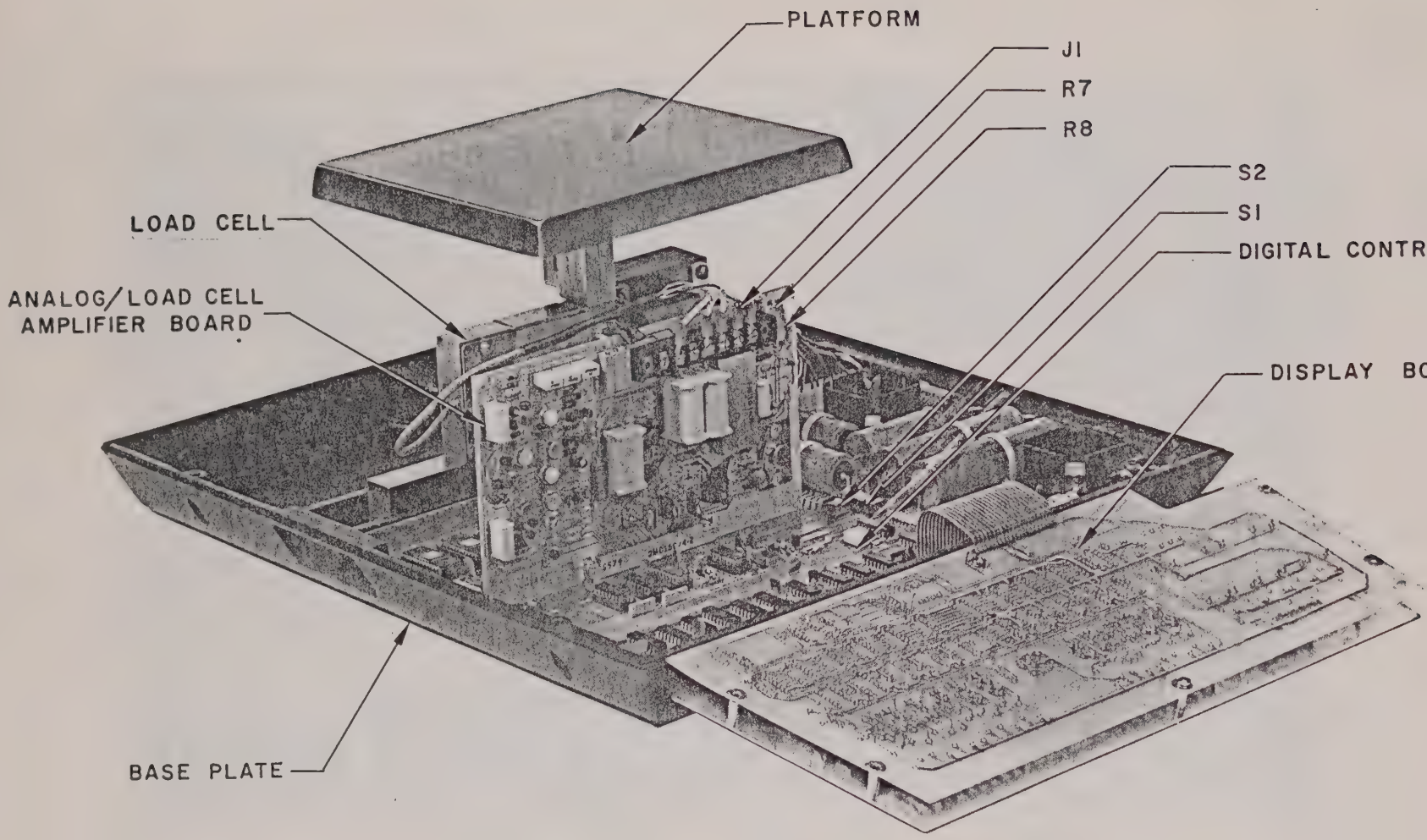
CONTAINER WEIGHT ZEROED OUT
READY TO APPLY SAMPLE OF 16

Figure 4.3



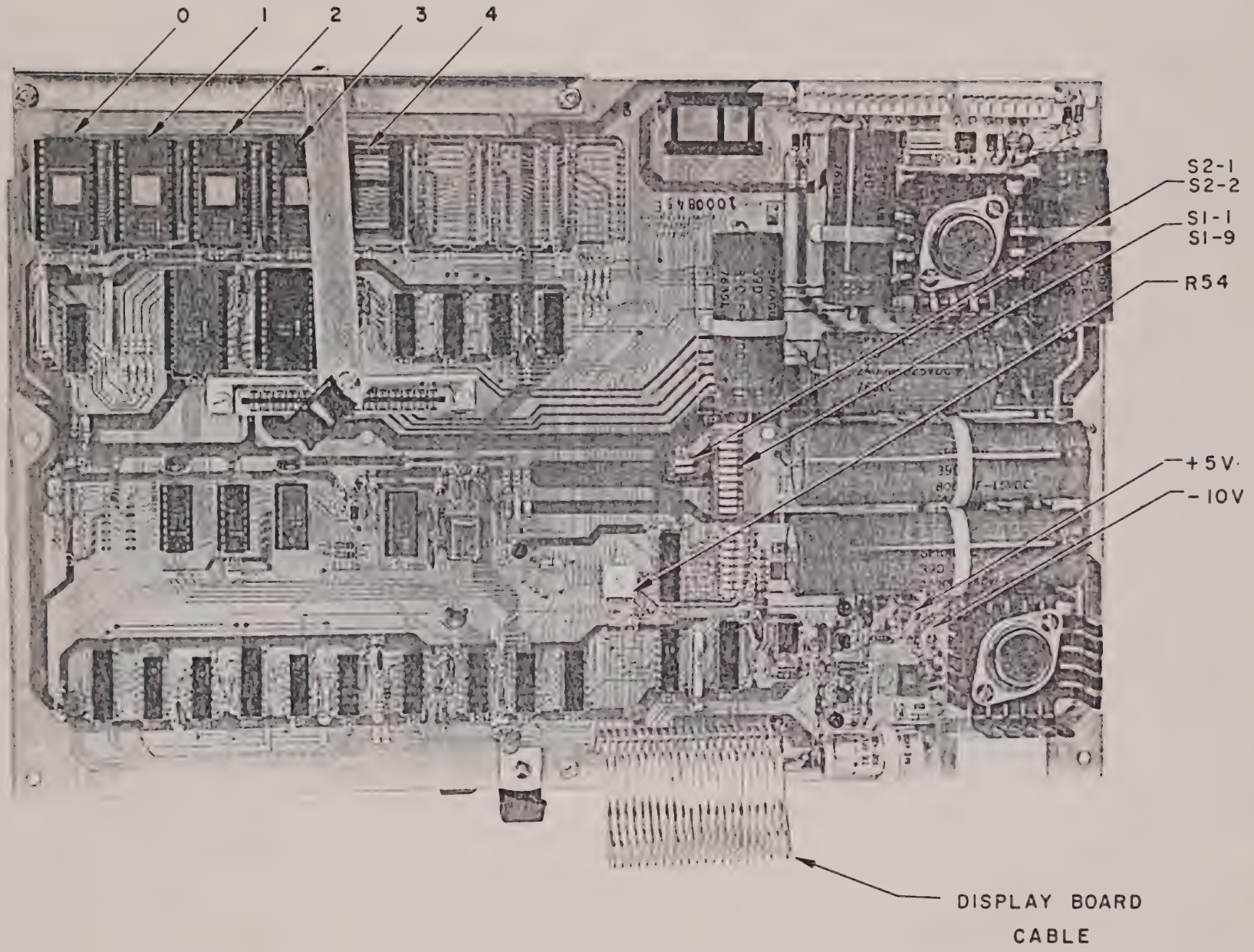
COUNTING PARTS

Figure 4.5



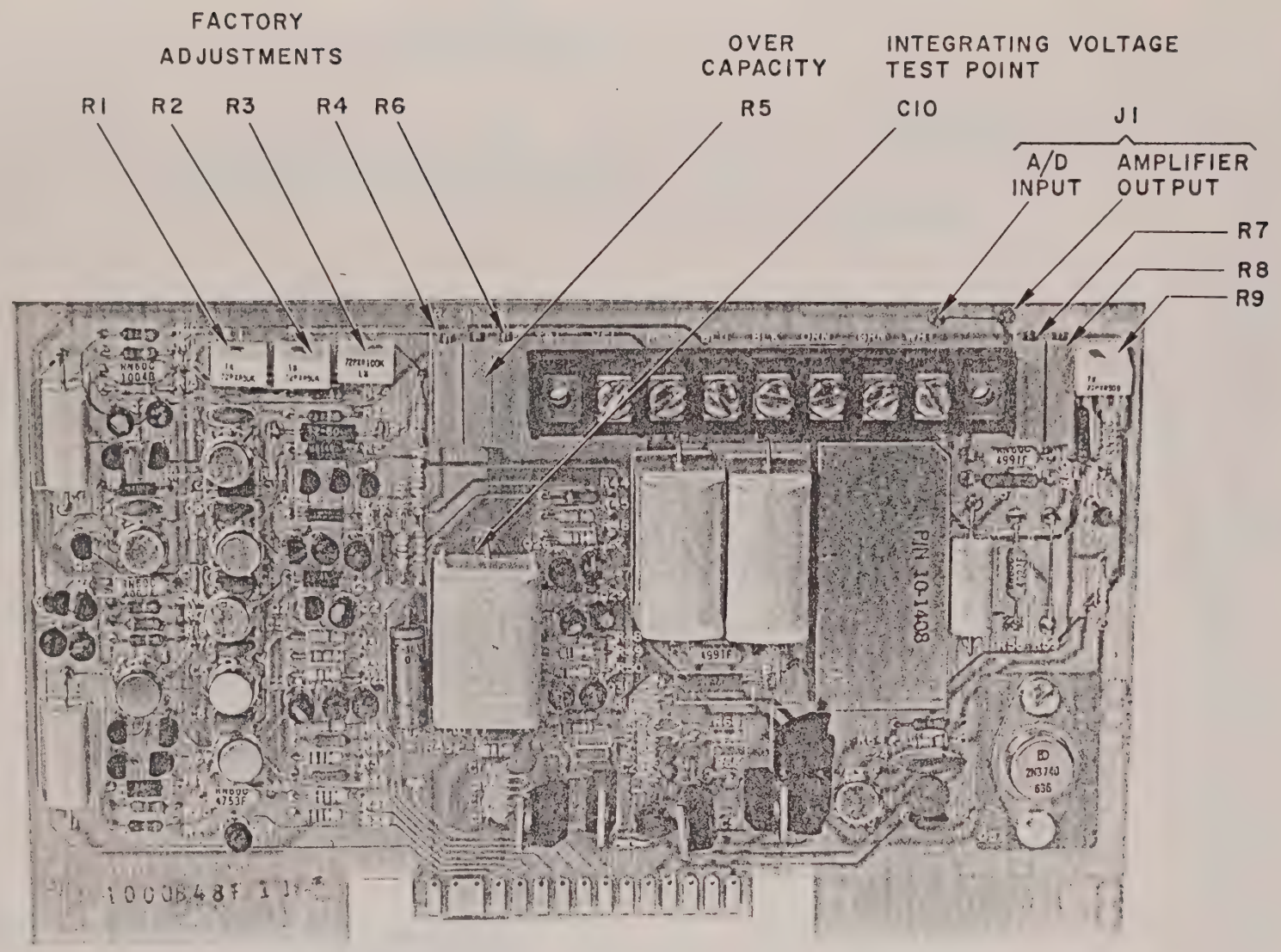
10 POUND CONFIGURATIO
EXPOSED VIEW

Figure 5.1



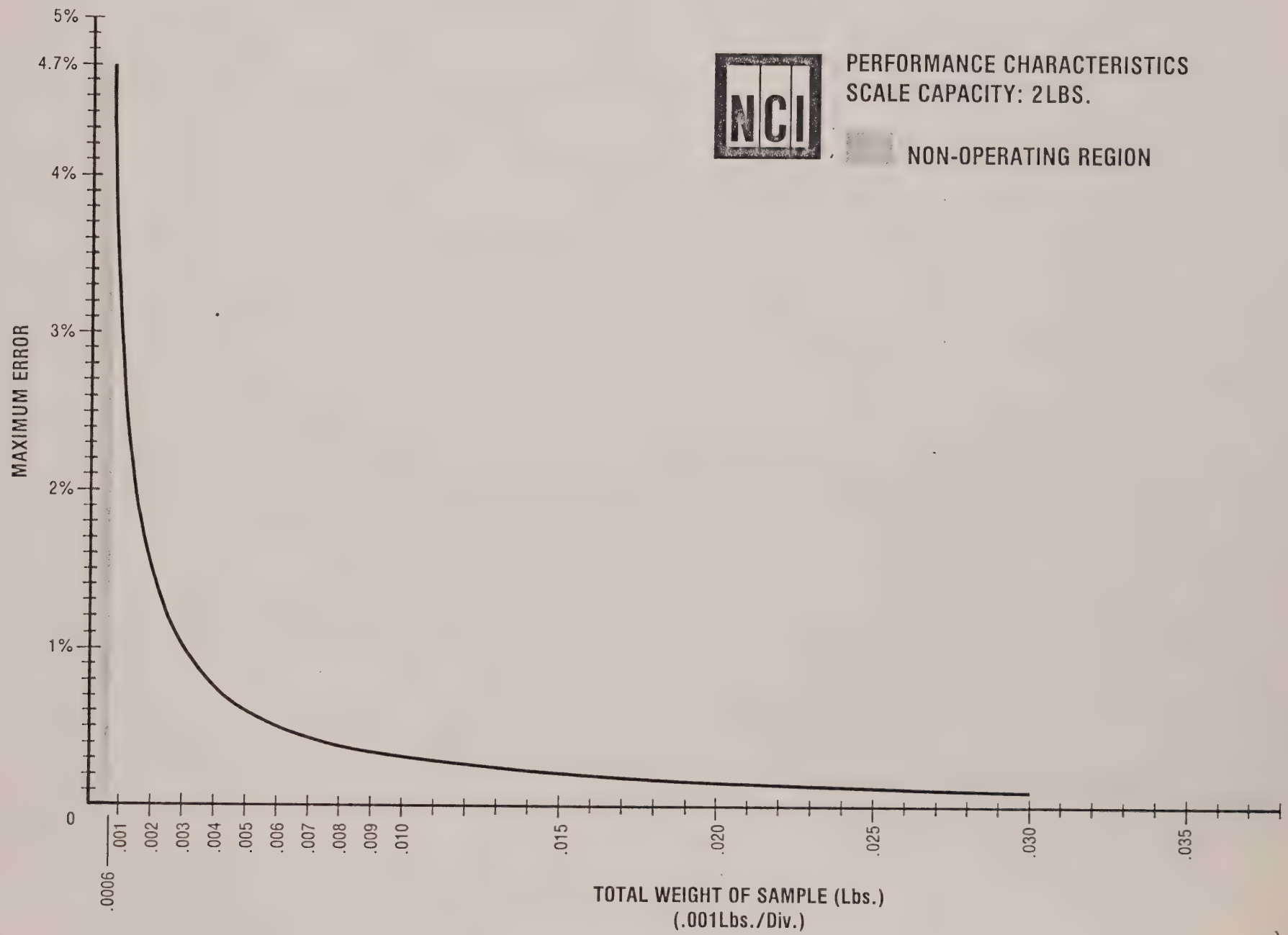
DIGITAL CONTROL BOARD

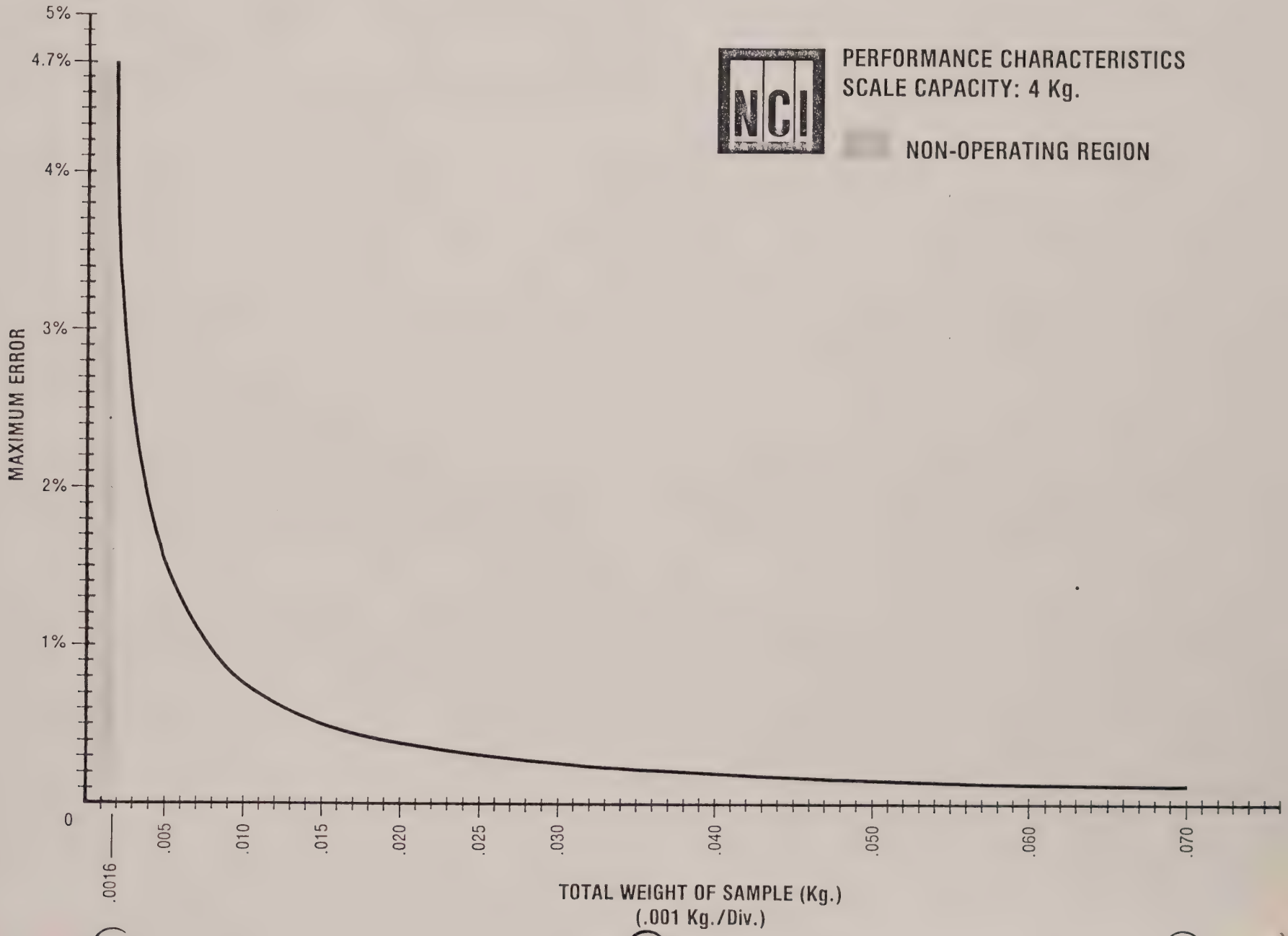
Figure 5.2

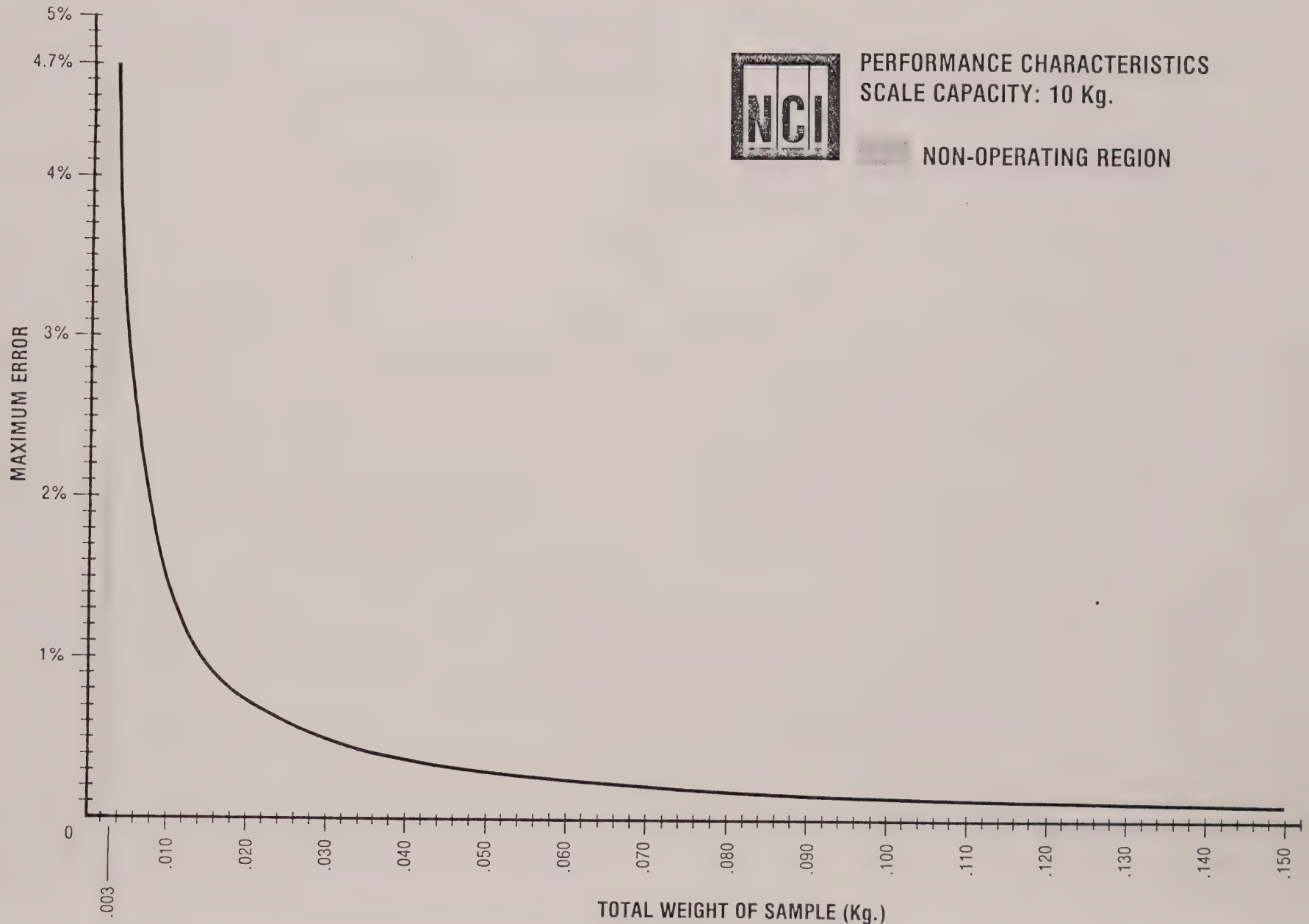


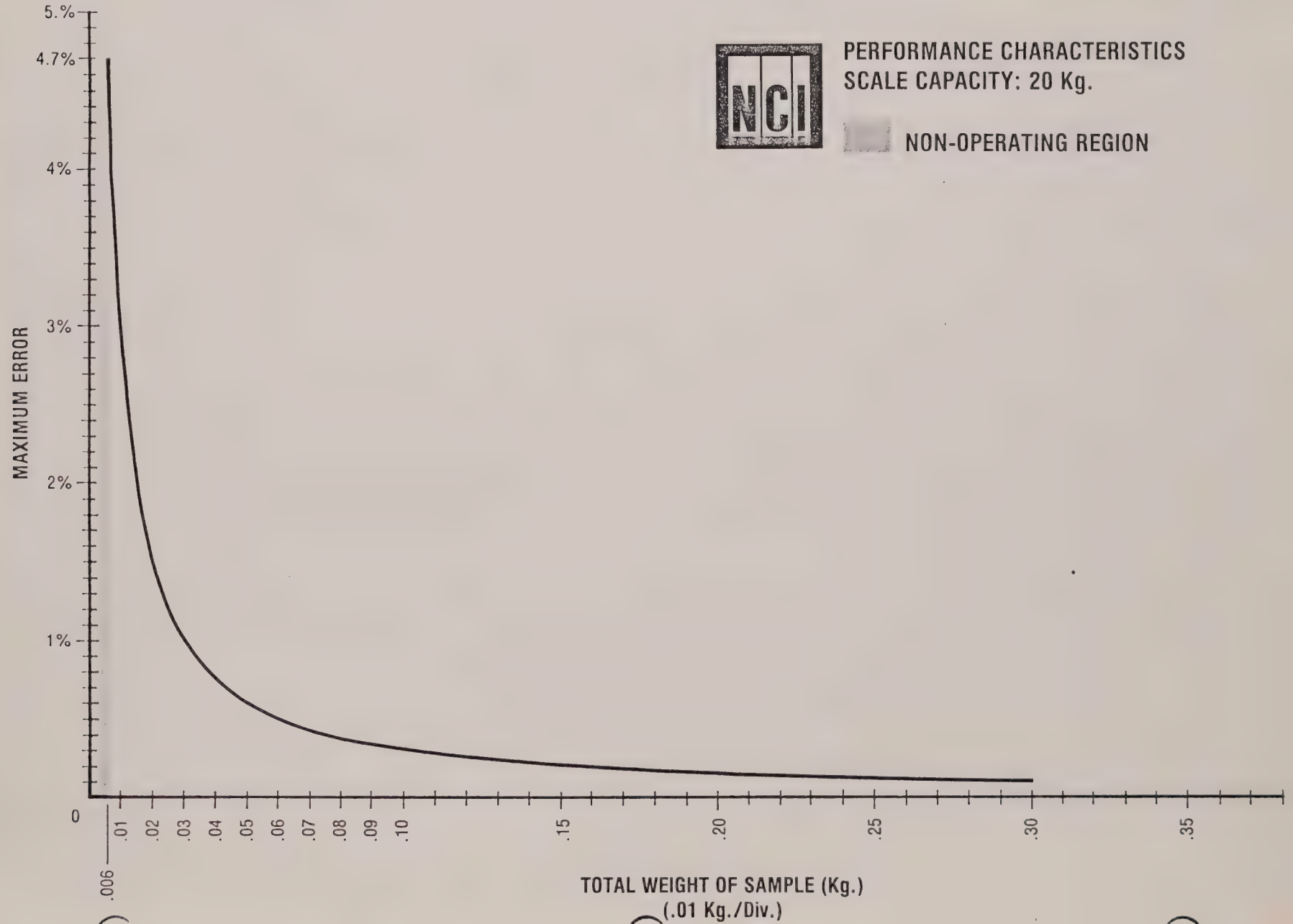
ANALOG/LOAD CELL AMPLIFIER

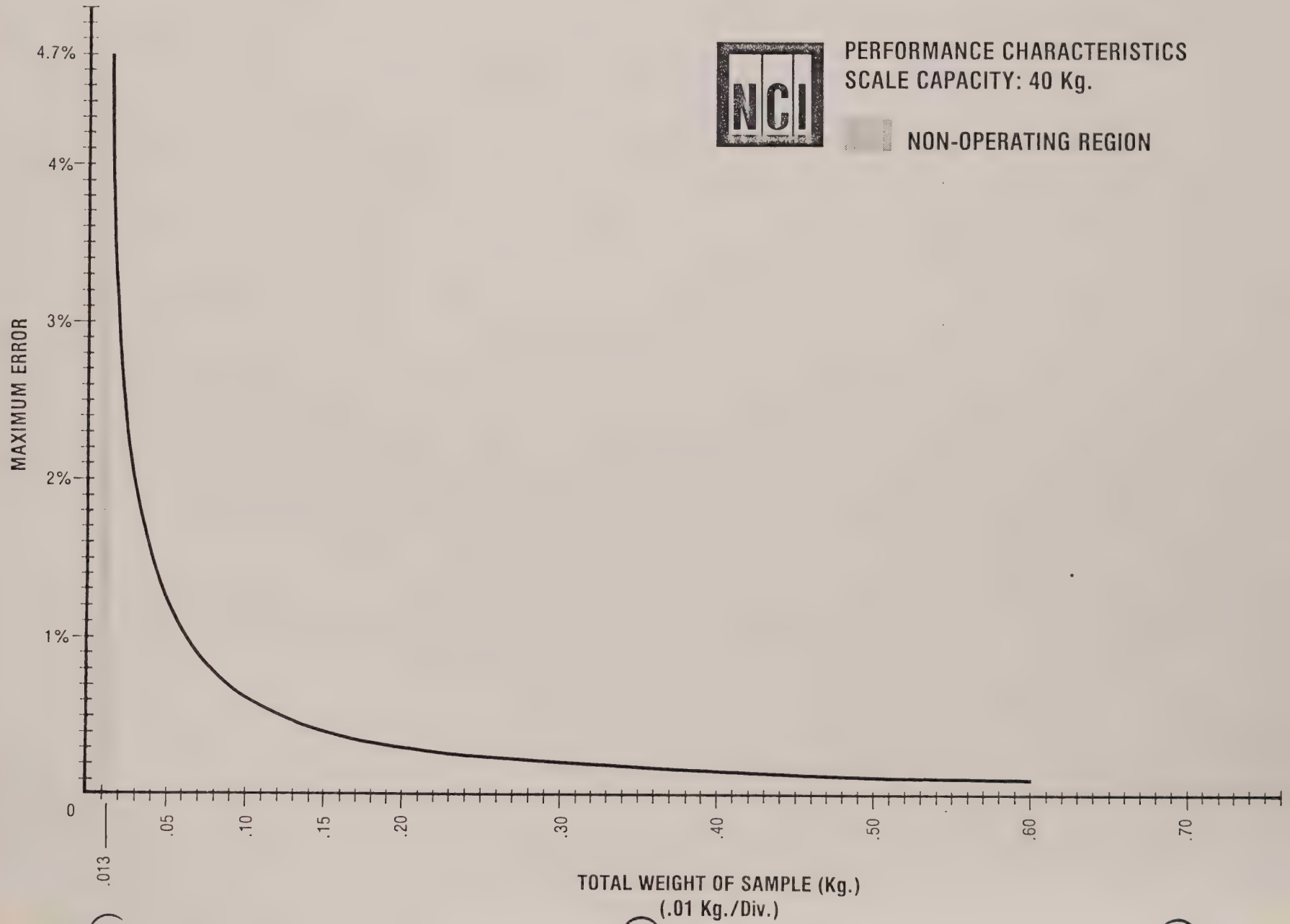
Figure 5.3

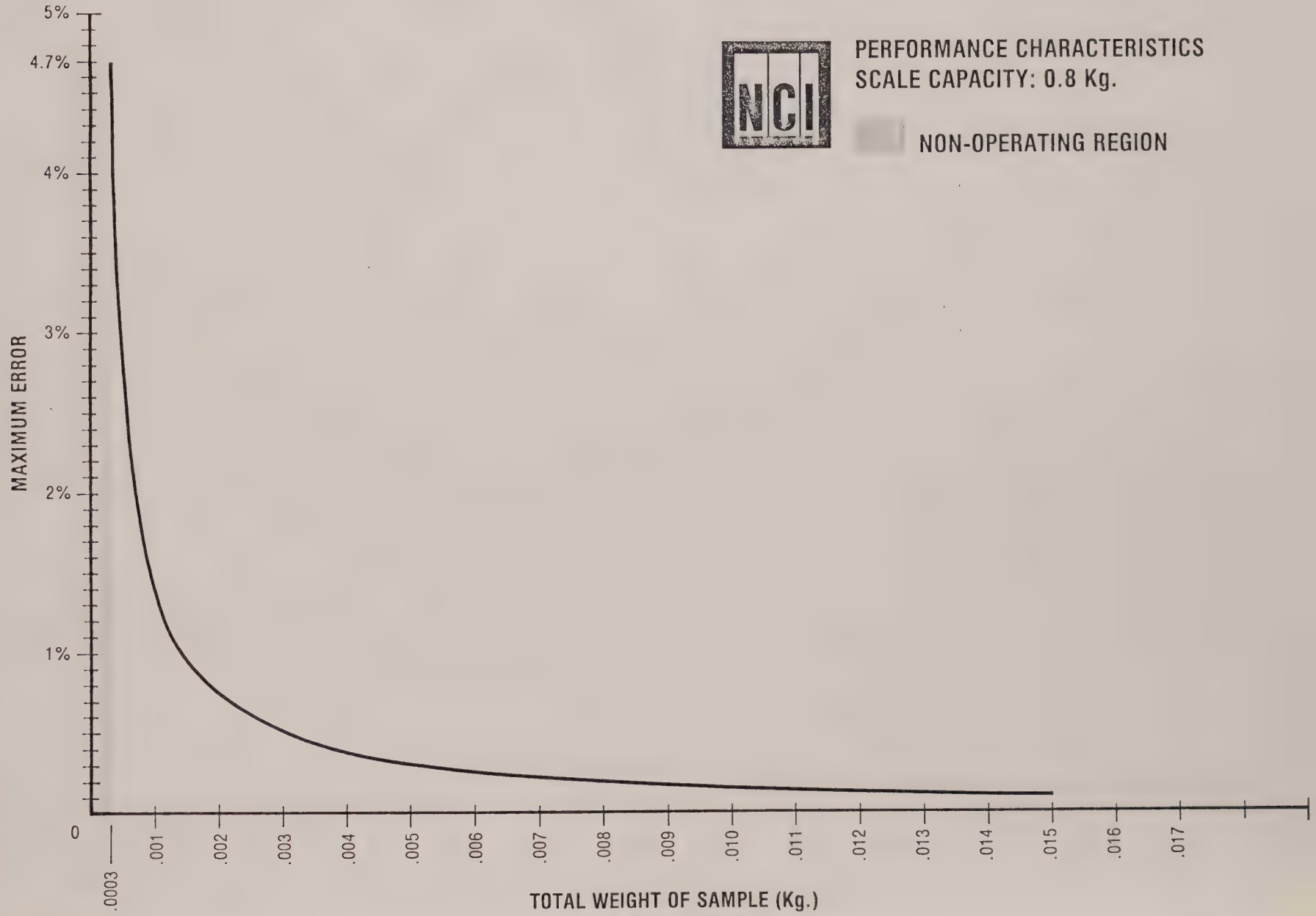

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 2LBS.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.0006
.001
.002
.003
.004
.005
.006
.007
.008
.009
.010
.015
.020
.025
.030
.035
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.001Lbs./Div.)

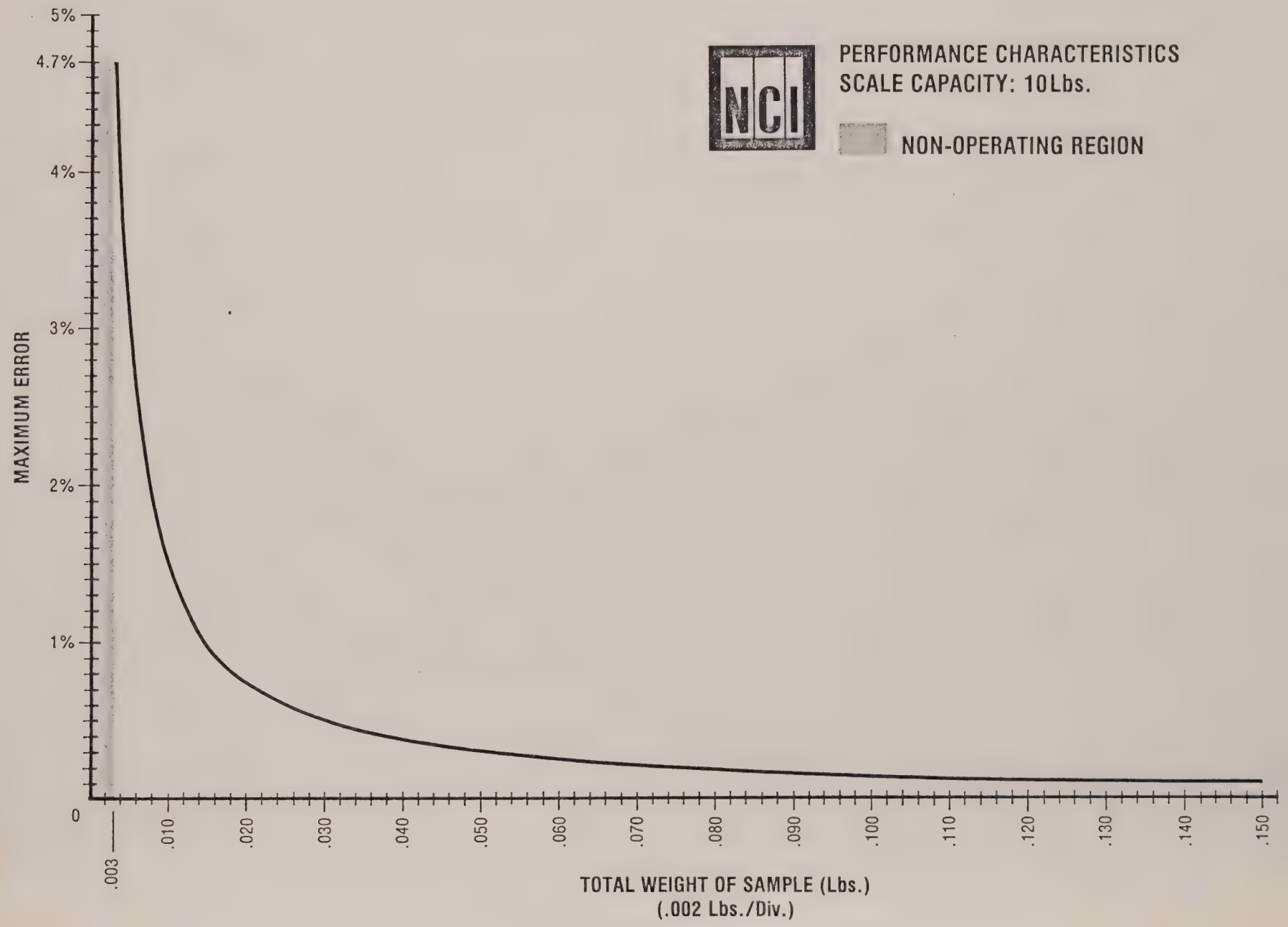

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 4 Kg.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.0016
.005
.010
.015
.020
.025
.030
.040
.050
.060
.070
TOTAL WEIGHT OF SAMPLE (Kg.)
(.001 Kg./Div.)

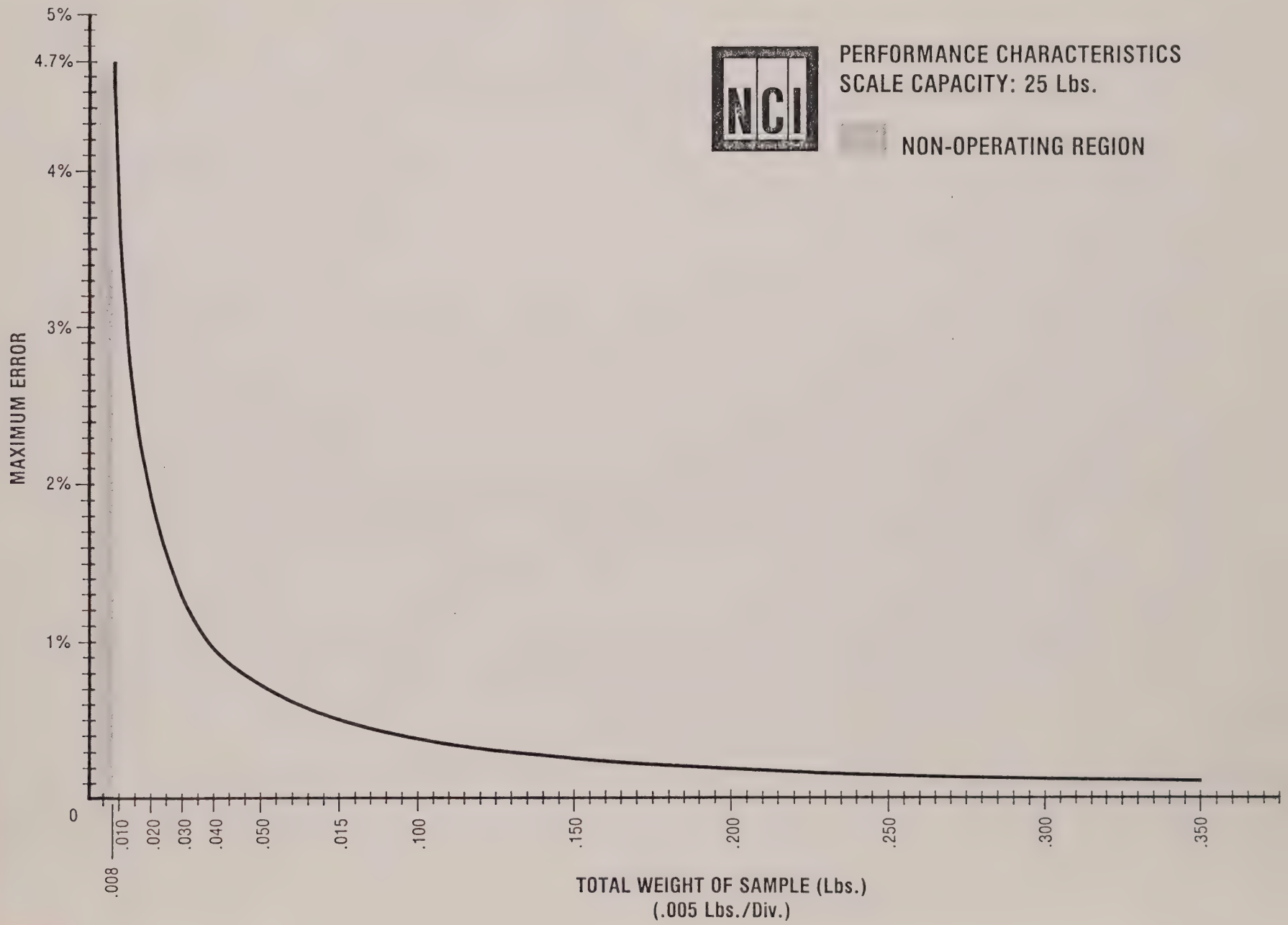

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 10 Kg.
NCI
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.003
.010
.020
.030
.040
.050
.060
.070
.080
.090
.100
.110
.120
.130
.140
.150
TOTAL WEIGHT OF SAMPLE (Kg.)
(.002 Kg./Div.)

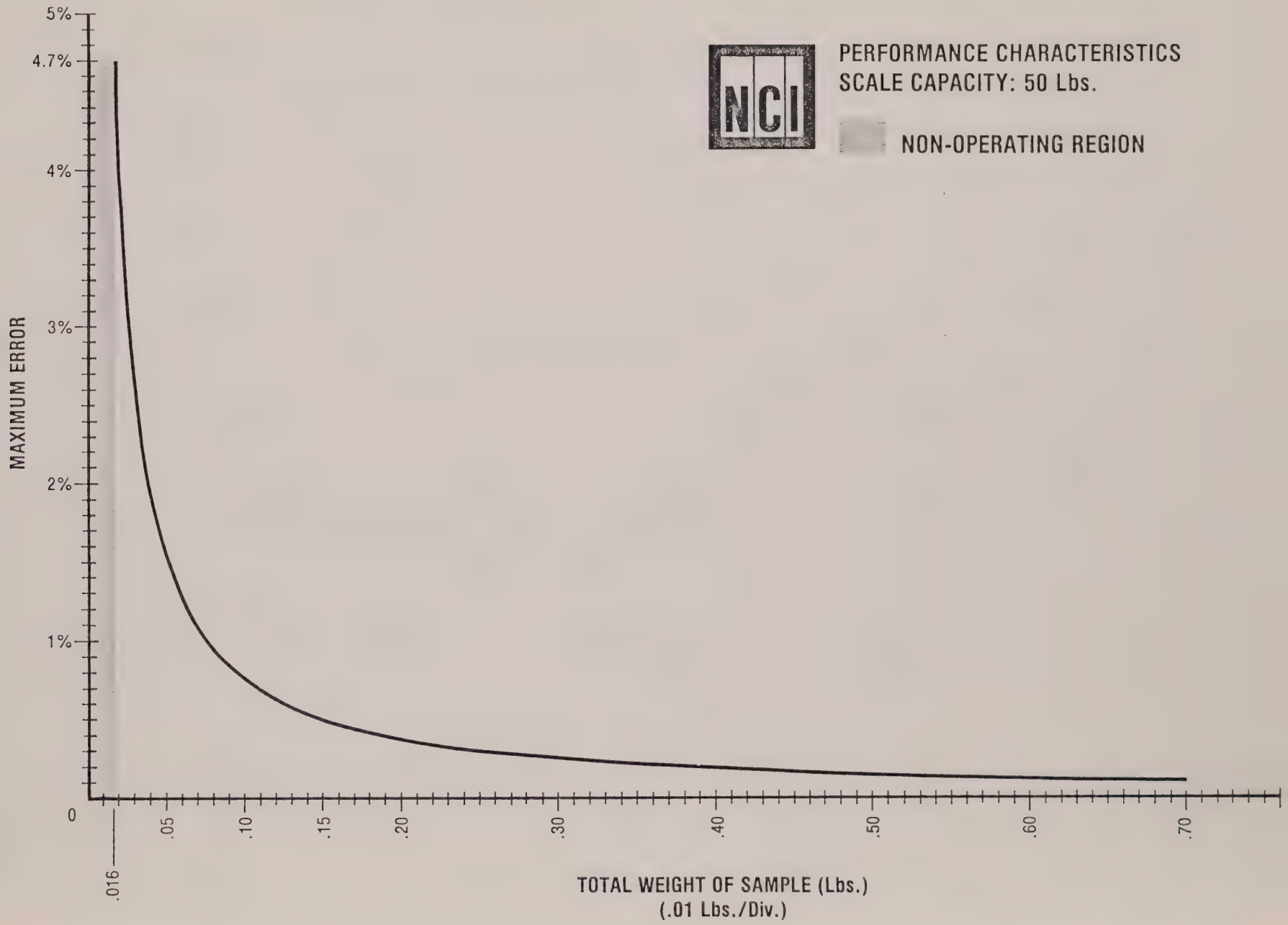

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 20 Kg.
NON-OPERATING REGION
MAXIMUM ERROR
5.%
4.7%
4%
3%
2%
1%
0
.006
.01
.02
.03
.04
.05
.06
.07
.08
.09
.10
.15
.20
.25
.30
.35
TOTAL WEIGHT OF SAMPLE (Kg.)
(.01 Kg./Div.)

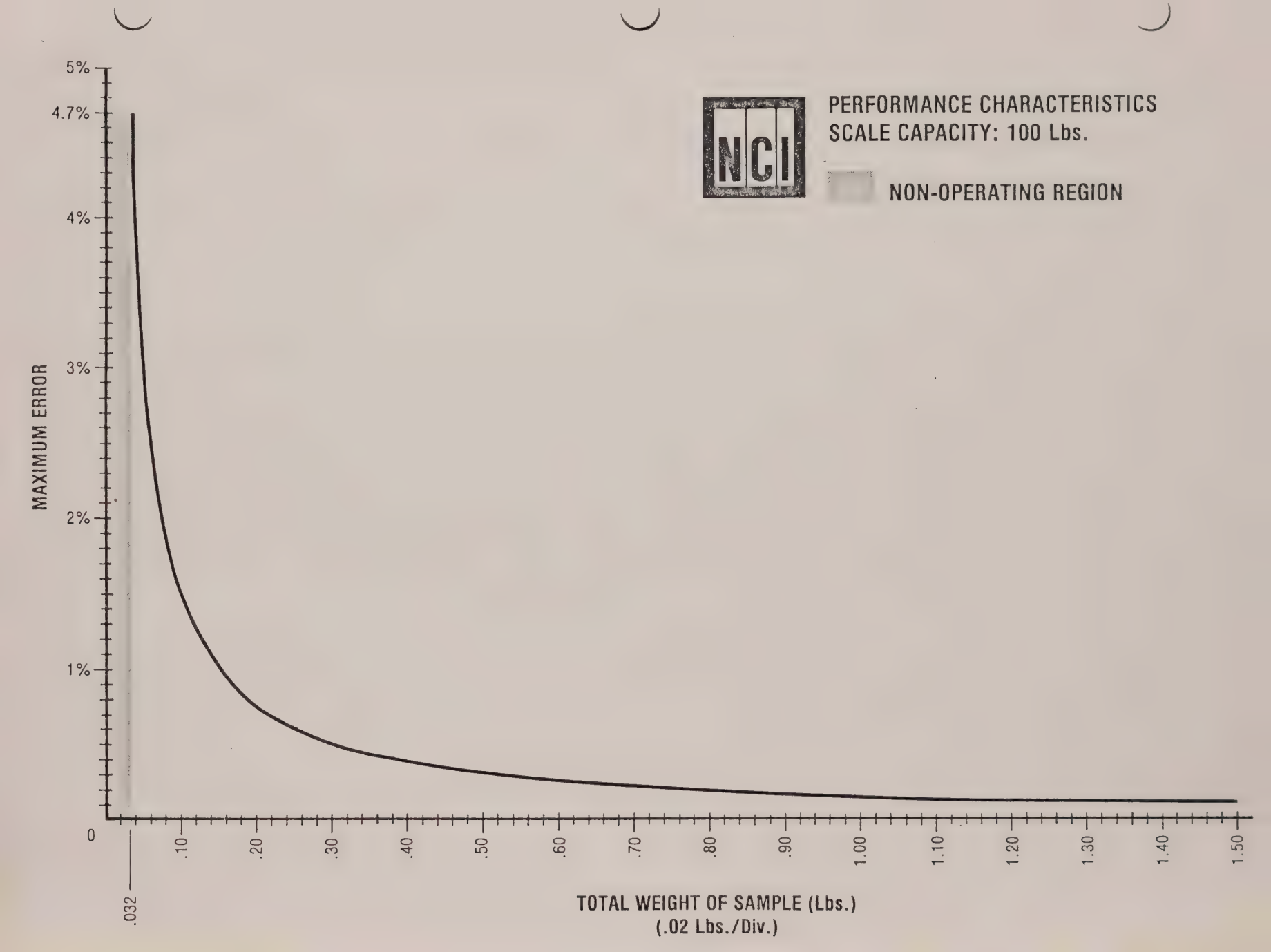

NCI
PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 40 Kg.
NON-OPERATING REGION
MAXIMUM ERROR
4.7%
4%
3%
2%
1%
0
.013
.05
.10
.15
.20
.30
.40
.50
.60
.70
TOTAL WEIGHT OF SAMPLE (Kg.)
(.01 Kg./Div.)

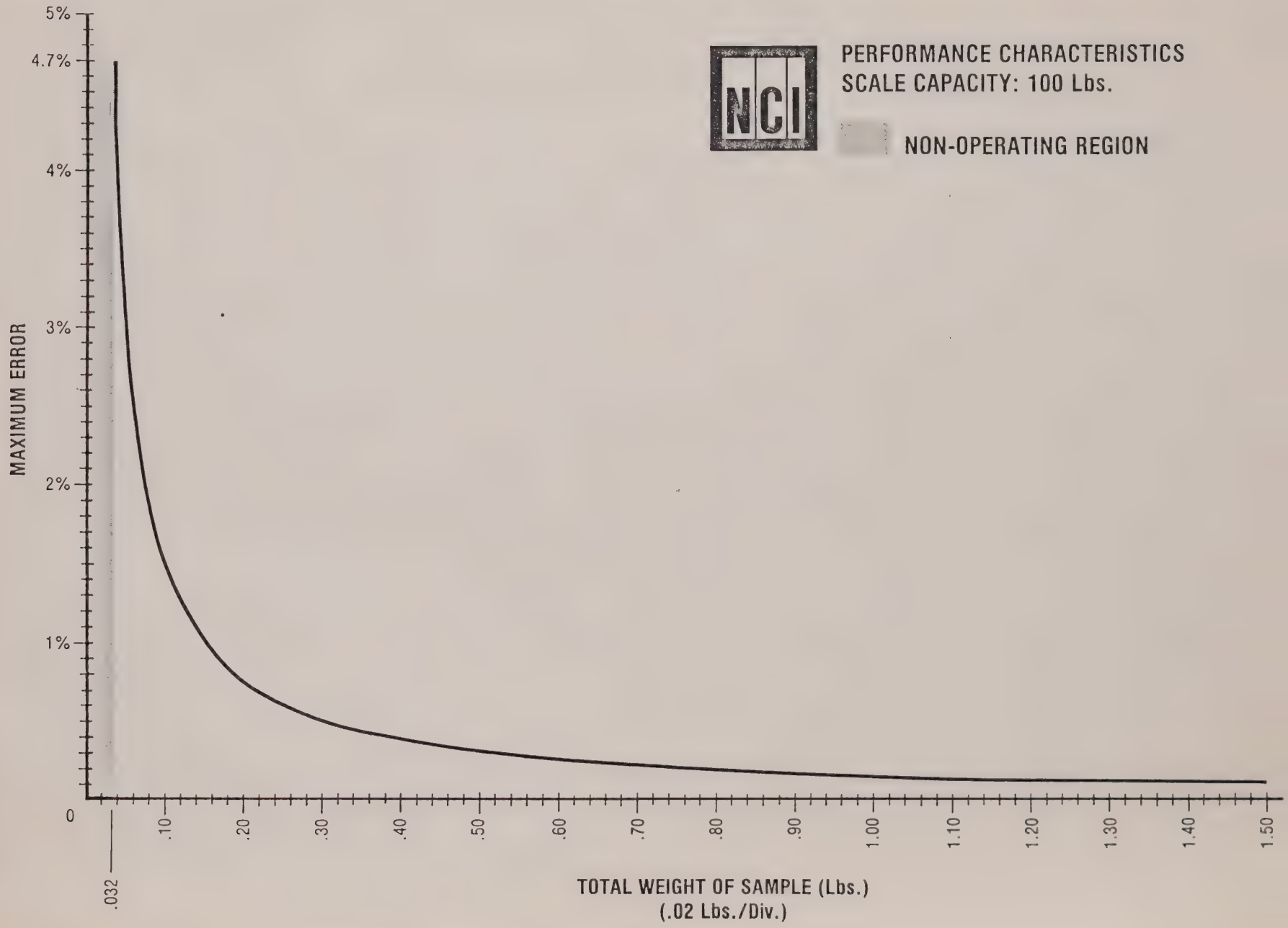

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 0.8 Kg.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.0003
.001
.002
.003
.004
.005
.006
.007
.008
.009
.010
.011
.012
.013
.014
.015
.016
.017
TOTAL WEIGHT OF SAMPLE (Kg.)
(0.001 Kg./Div.)

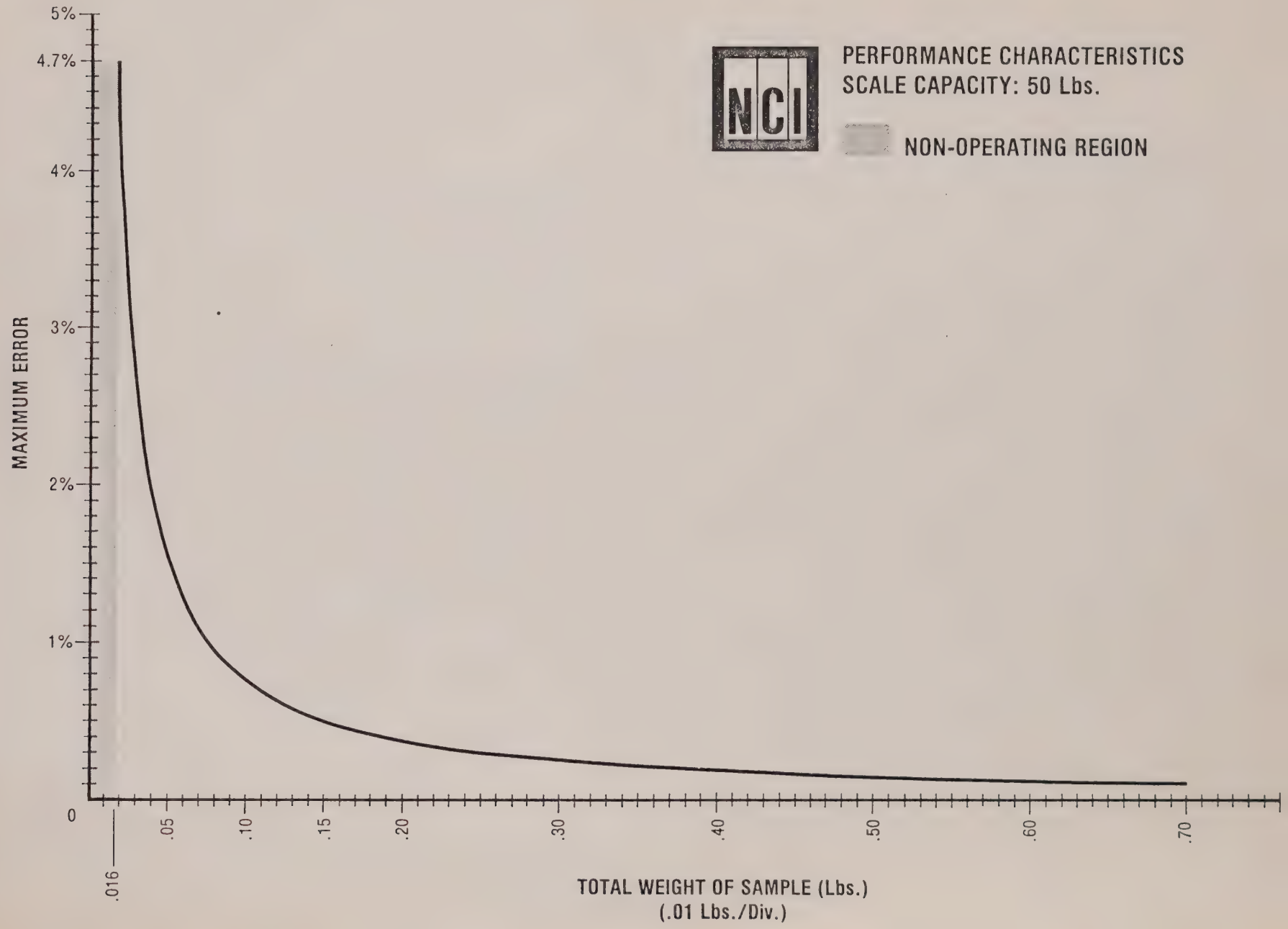

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 10Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.003
.010
.020
.030
.040
.050
.060
.070
.080
.090
.100
.110
.120
.130
.140
.150
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.002 Lbs./Div.)

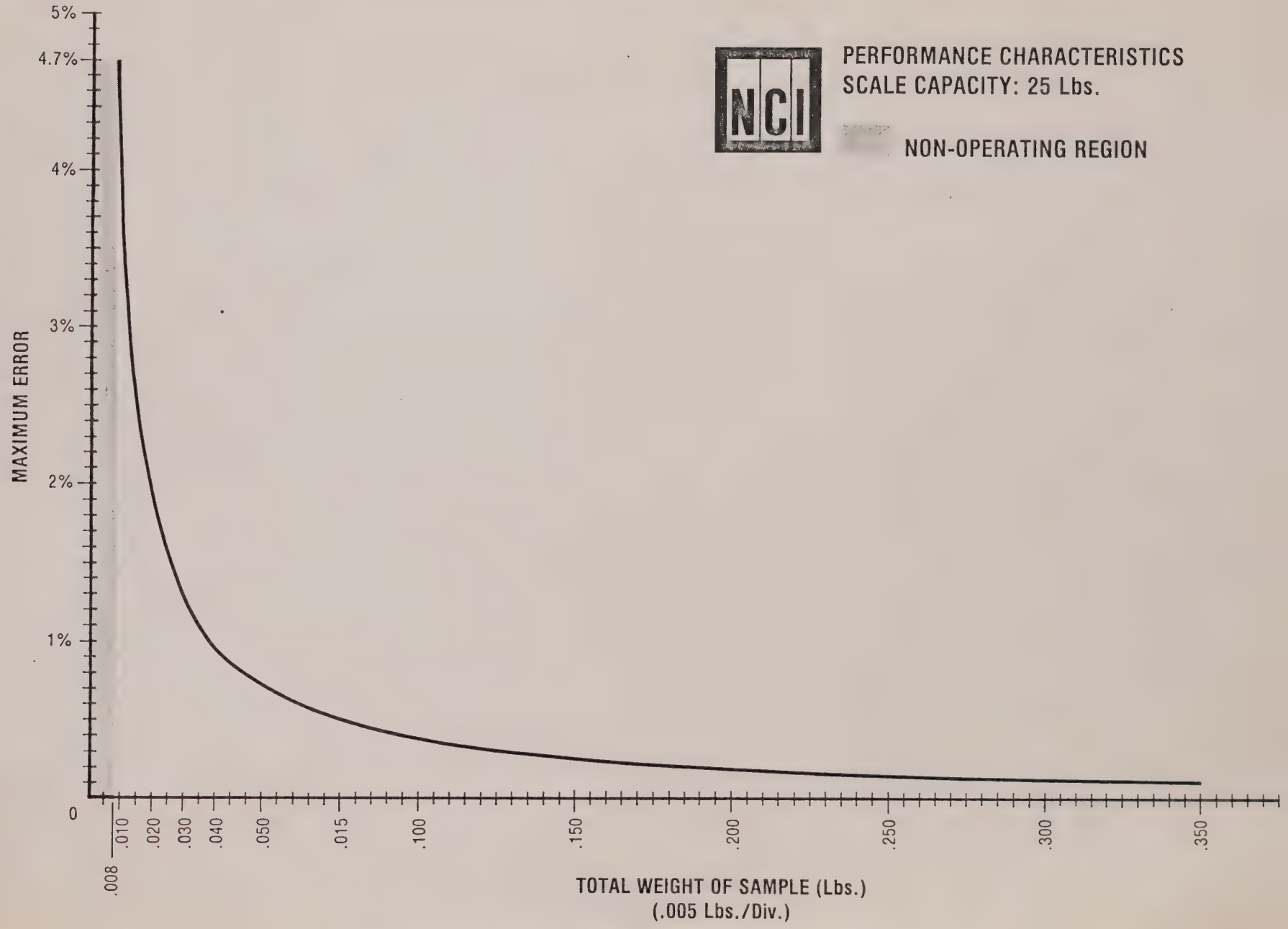

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 25 Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.008
.010
.020
.030
.040
.050
.015
.100
.150
.200
.250
.300
.350
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.005 Lbs./Div.)

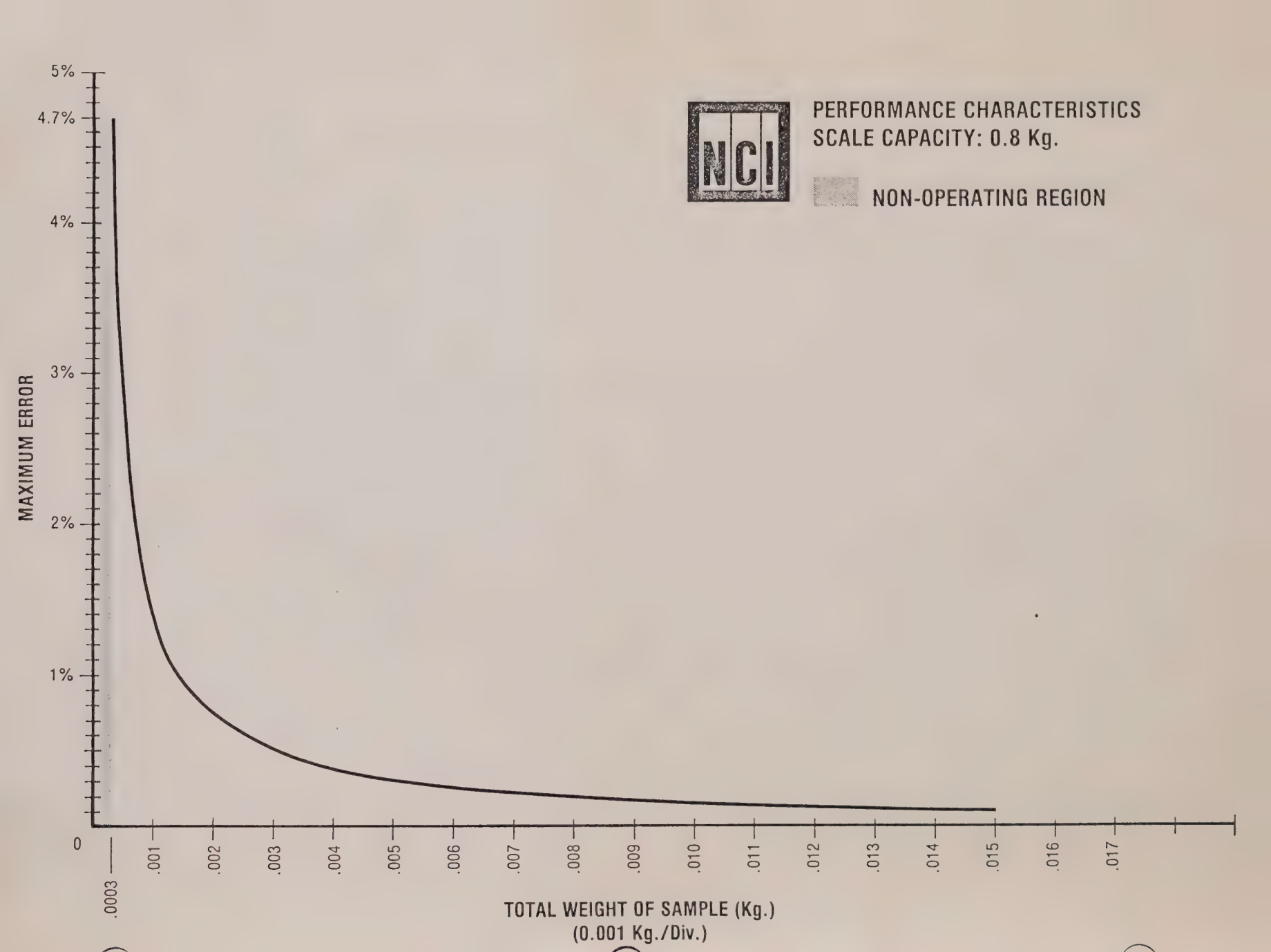

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 50 Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.016
.05
.10
.15
.20
.30
.40
.50
.60
.70
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.01 Lbs./Div.)

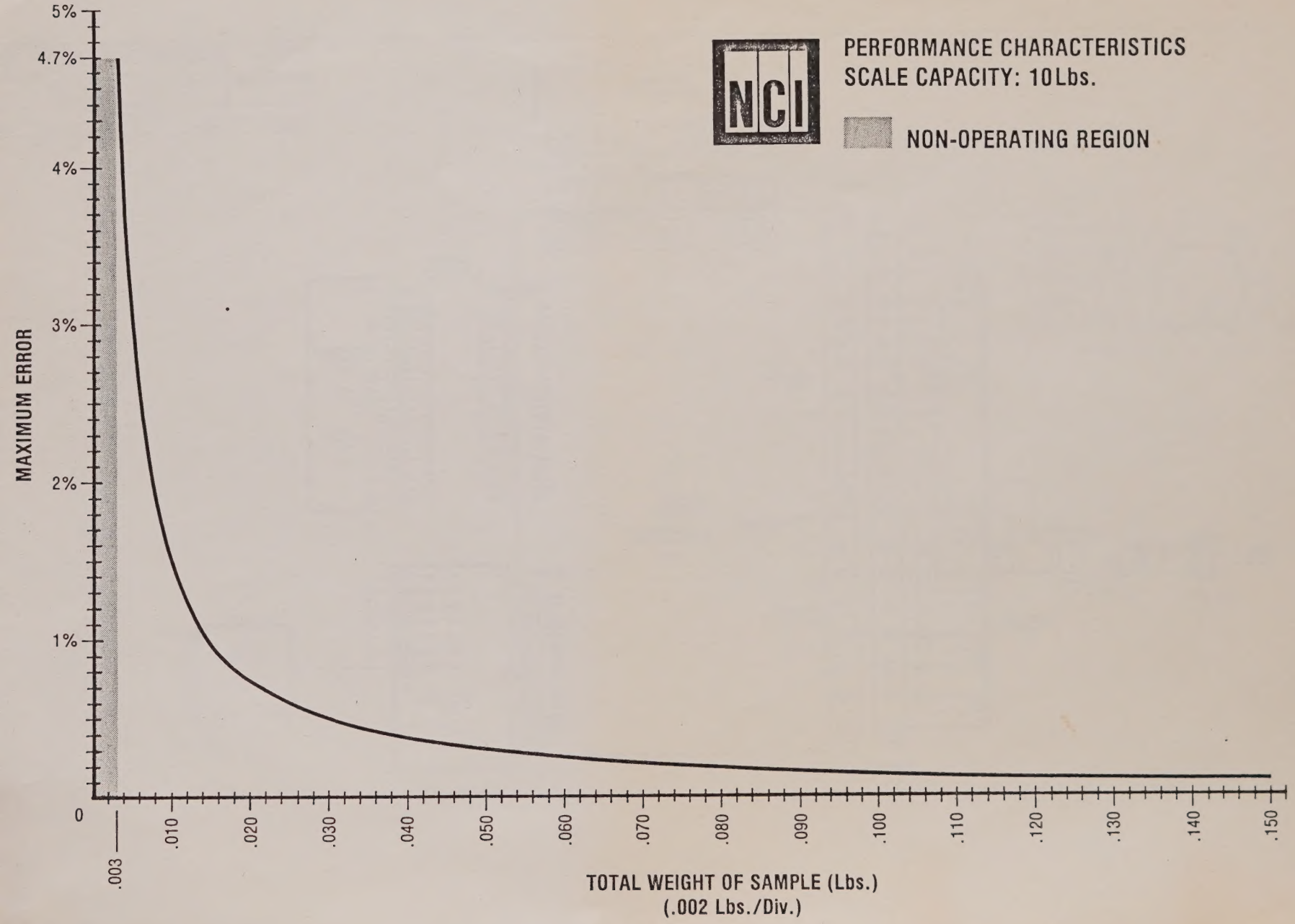

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 100 Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.032
.10
.20
.30
.40
.50
.60
.70
.80
.90
1.00
1.10
1.20
1.30
1.40
1.50
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.02 Lbs./Div.)


PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 100 Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.032
.10
.20
.30
.40
.50
.60
.70
.80
.90
1.00
1.10
1.20
1.30
1.40
1.50
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.02 Lbs./Div.)

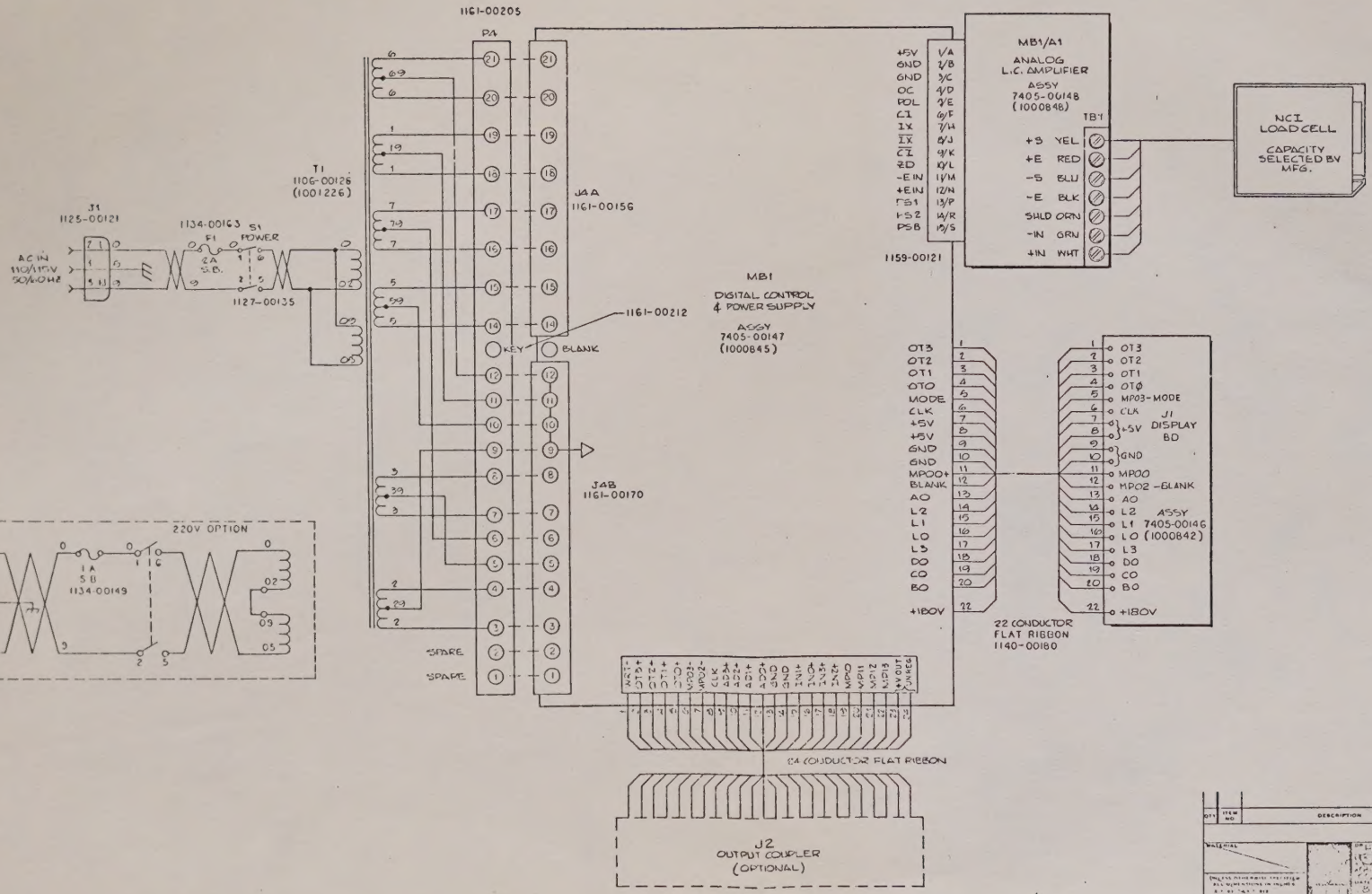

PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 50 Lbs.
NCI
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.016
.05
.10
.15
.20
.30
.40
.50
.60
.70
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.01 Lbs./Div.)


PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 25 Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.008
.010
.020
.030
.040
.050
.015
.100
.150
.200
.250
.300
.350
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.005 Lbs./Div.)


NCI
PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 0.8 Kg.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.0003
.001
.002
.003
.004
.005
.006
.007
.008
.009
.010
.011
.012
.013
.014
.015
.016
.017
TOTAL WEIGHT OF SAMPLE (Kg.)
(0.001 Kg./Div.)


PERFORMANCE CHARACTERISTICS
SCALE CAPACITY: 10Lbs.
NON-OPERATING REGION
MAXIMUM ERROR
5%
4.7%
4%
3%
2%
1%
0
.003
.010
.020
.030
.040
.050
.060
.070
.080
.090
.100
.110
.120
.130
.140
.150
TOTAL WEIGHT OF SAMPLE (Lbs.)
(.002 Lbs./Div.)

LTR	DESCRIPTION	DATE
A	ORIGINAL ISSUE	8-76
B	CORRECT FH, ADD LABELS	9-76
C	CORRECTED LABEL #2	11-76
D	ADDED 220V OPTION	11-77
E	CHG 220V IN WAS 110/115V	2-1-77



QTY	ITEM NO	DESCRIPTION	PART NO	MANUFACTURER CODE IDEN NO	MATERIAL

BILL OF MATERIAL

MATERIAL

DRAWN

TITLE: MASTER SCHEMATIC
MODEL 8000 MK IV
COUNTING SCALE

SCALE: 3/4 —

CUSTOMER: NCI STANDARD

NCI NATIONAL CONTROLS, INC. SANTA ROSA, CALIF.

8400-00117